ALFRED F. LOOMIS, whose vivid stories of the care-free voyage of Hippocampus have delighted thousands of readers, reports that he is commencing to have further trouble with that loose ankle bone of his. He has managed to remain pretty much in one place since his return to New York last fall, but the roving spirit is on him again, and in a month or so he will set sail by steamer to Panama, there to pick up his little auxiliary yawl and roam the Spanish Main.

Although an exact promise is not possible at this early date, we hope the first of the new series will appear in the August issue. The author hints darkly of visiting a tribe of Central American Indians who have hitherto successfully defied interviewers, of fishing for tarpon from dry land, of hunting for deer and tapir by motor boat, and of various other matters of novel appeal.

Needless to say, unforeseen adventures will befall Mr. Loomis, and he will record them in his inimitable style exclusively for the readers of MoToR BoatinG. His old crew of Squibb and Chambers having left him, he will be accompanied on this cruise by a new one, of which at this juncture he says only that it is not a one-man crew.

WORD has reached us of the formation of an organization to be known as The Cruising Club of America, whose objects will be—so it is stated—to promote and facilitate cruising by amateurs, to encourage the development of suitable types of sail, motor and auxiliary craft for cruising purposes, and to stimulate an interest in seamanship and the navigation and handling of small vessels. Offhand, we should say that any organization which has in its preamble these worthy objects should be a good thing for the sport, and MoToR BoatinG is for it. However, it should not be assumed that an organization having such reasons for its existence is by any means a new one.

Brigydon II, a 40-foot Luders cruiser, on Green Bay, Wis. She is owned by E. F. Folda of Omaha, Neb.

MOTOR BOATING

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MAY 1922

VOLUME XXIX No. 5

SINCE 1912 the United States Power Squadrons have been developing a high standard of skill in the handling and navigation of power boats, encouraging the study of the science of navigation and have stimulated interests in activities which tend to the upbuilding of our merchant marine and our navy. Tens of thousands of motor boatmen and yachtsmen have been interested and actually instructed in these fundamentals by the Power Squadrons in various centers of this country. During the war period no less than five thousand young men were given courses of instruction which enabled them to enter the naval reserve forces of our country. Since then instruction courses held by the Power Squadron have stimulated interests in navigation, seamanship, and small boat handling, all of which are closely allied to the sport of cruising. During the past winter Power Squadron instruction meetings in New York, at the New York Athletic Club, the Tamaqua Yacht Club, the Columbia Yacht Club, and elsewhere have been attended by more than 2,800 persons interested in cruising and have been instructed in those elements related to it.

IF the new Cruising Club of America is for sane and legitimate cruising and real cruising craft, we are for it very strong! But too much publicity has already been given such events as crossing the Atlantic in a canoe and rowing around the world. Such forms of boating, being only stunts and showing nothing, should be discouraged. Membership in the new cruising club is by invitation only. A list of the charter members of the originators shows that the originators have been able to keep to the channel pretty closely. We hope the invitations to join may be extended to some who have cruised further in a week than a few of the charter members have in a lifetime. But—as Mark Anthony might have said, "We come to praise the new organization; not to bury it."

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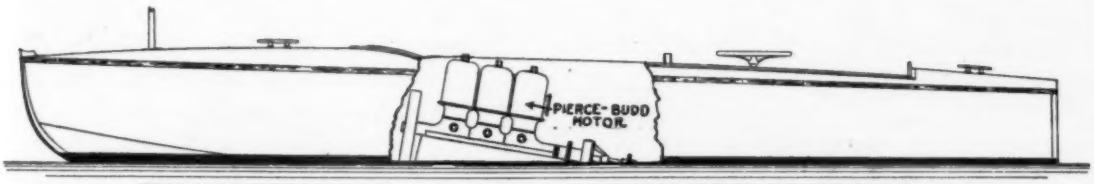
John L. Hacker Specifies

Pierce-Budd Motors



Miss Mississippi, 17 ft. hydroplane, developed from the famous Mississippi Valley racers. 18-25 H.P. Pierce-Budd Motor specified.

DON'T fail to see John L. Hacker's complete plans for Miss Mississippi in this issue of MoToR BoatinG. Mr. Hacker is the most consistently successful designer of speed runabouts and hydroplanes. In this design he has developed and improved one of the most popular speed boats ever built.

Hacker knows boats and he knows motors. He specifies the Pierce-Budd motor for Miss Mississippi "for the great horsepower it delivers and its extremely light weight". Speeds as high as 33 to 34 miles per hour have actually been made by these Pierce-Budd powered hydros.

Pierce-Budd Motors have been making and breaking records in boats of this type since the motor was first introduced 13 years ago. It gives the utmost power and speed with the minimum weight and at the lowest possible cost. That's what you want in any boat, whatever the type.

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1 to 6 Cylinder, High Speed and Heavy Duty Models

The finest of design, workmanship and materials throughout. Suited for runabouts, hydroplanes, family launches, cruisers and work boats, in fact any type of pleasure or commercial boat. More H.P. for your money and most H.P. for their weight. Built for salt water use.

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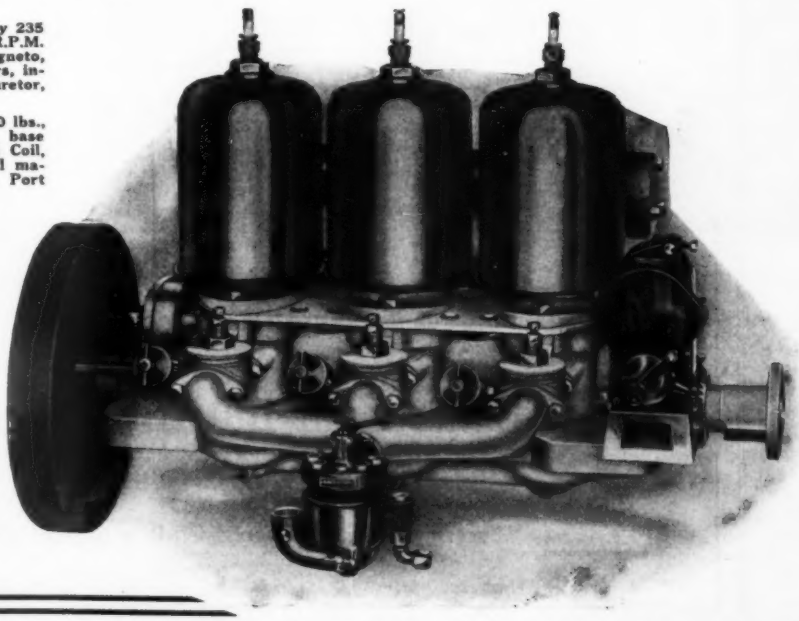
Write today for full details and prices. Territory open for dealers.



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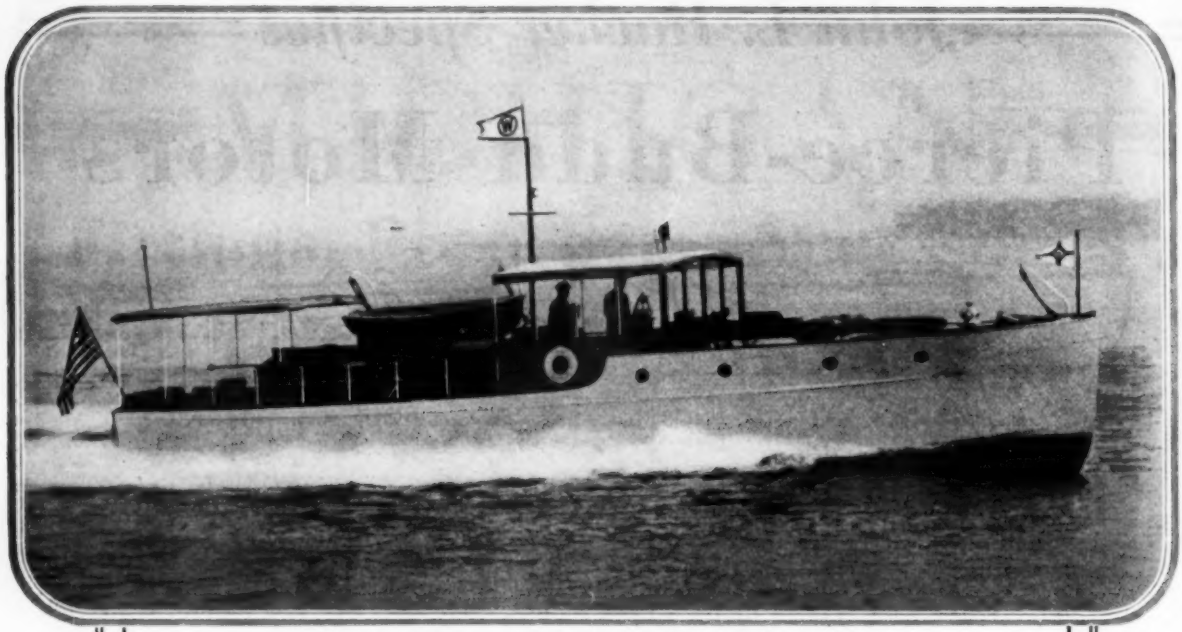

"Fifty-Four Foot Great Lakes Standardized Express Cruiser"

54 and 42 foot Standardized Express Cruisers on current shop schedule available for May and June delivery.

Bulletins 211 and 340 give complete information.

Great Lakes Boat Building Corporation

Milwaukee, Wisconsin

"Largest Builders of Express Cruisers in America"

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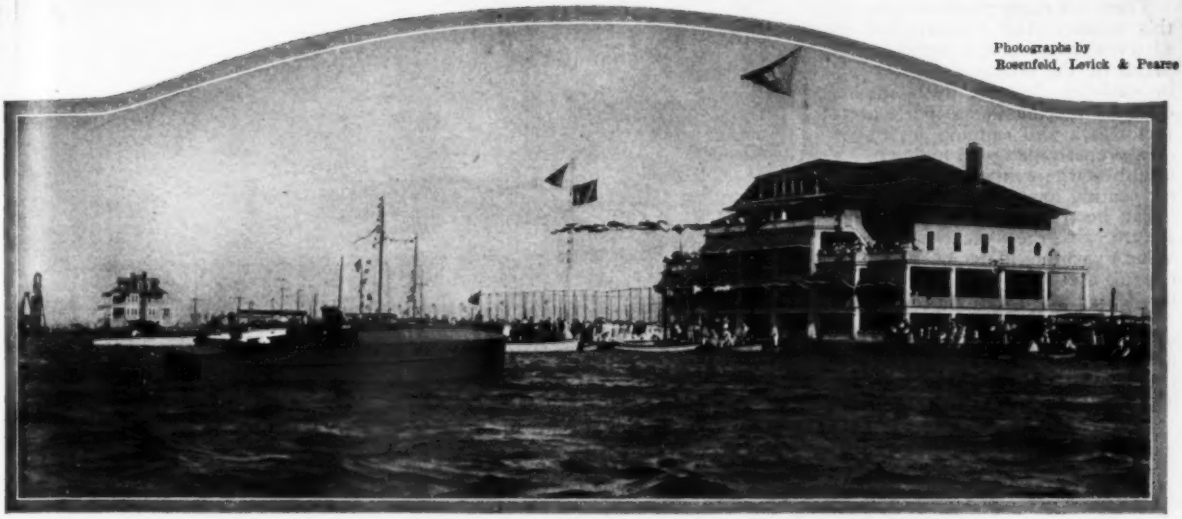
Rosenfeld, Levick & Pearse



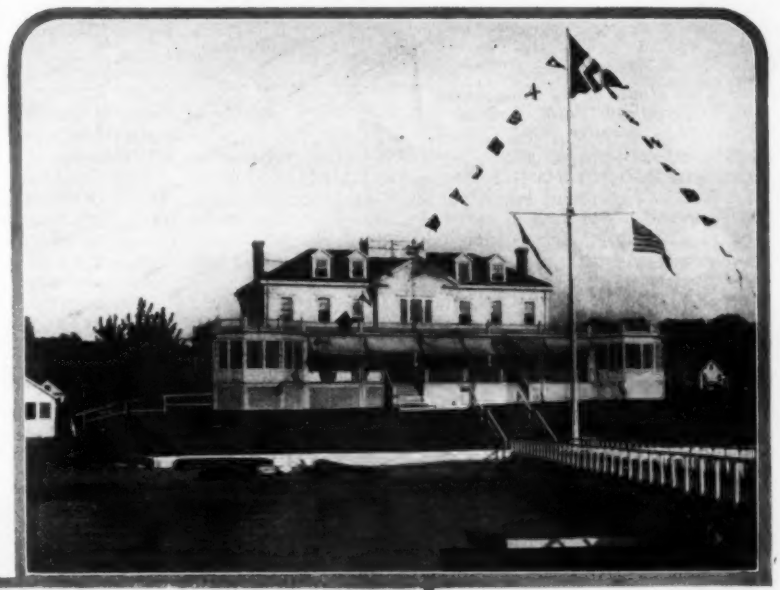
A Typical Club House on the South Jersey Coast

The Necessity of Organization

The Important Part Which the American Yacht Clubs Play in the Sport of Motor Boating —Suggestions for Forming and Properly Maintaining Yacht and Motor Boat Clubs

By Charles F. Chapman

THE success of yachting and motor boating in this country owes much to the American Yacht Clubs. The clubs have been a large factor in bringing boating to its present high plane of development. Almost everything which is worth while in yachting today can be traced directly or indirectly to the yacht club. Racing, good legislation, and fair laws, a high standard of skill in the handling and operation of motor boats, facilities for the mooring of our craft and their maintenance while the owners are absent, the development of safe harbors and waterways and real comradeship are all directly attributable to the yacht club.



The Manhasset Bay Yacht Club

One of the stations of the New York Yacht Club

It is essential that every motor boatman and yachtsman belong to a yacht club. The amount of enjoyment which he will derive from the sport is, to a large extent, dependent upon it. The many advantages of being a member of a club are too well known and too numerous to require enumeration.

There are many yacht clubs in this country—the complete list shows over seven hundred. Much of the boatman's success in yachting depends upon the club. The club is as much a factor as a well running engine or a properly designed hull. In localities where interest in motor boating has waned, much of it can be traced directly to the failure of the yacht clubs. Where yachting is the most successful, there will be found the big, active and successful clubs.

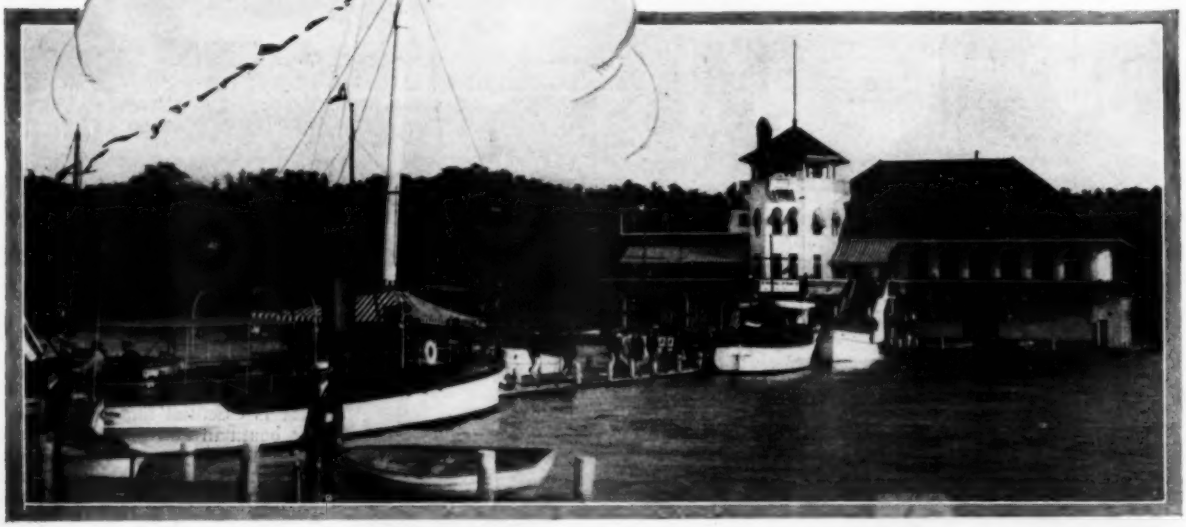
Generally speaking, a member of a club gets much more out of his club than he puts into it. Upon a few enthusiastic and loyal members most often is a great share of the burden placed for the success of the club. It can not be otherwise, but this fact is generally lost sight of by many of the less appreciative members of any organization.

Former home of the Indian Harbor Yacht Club on Long Island Sound

Club House of the Seawanhaka Corinthian Yacht Club at Oyster Bay

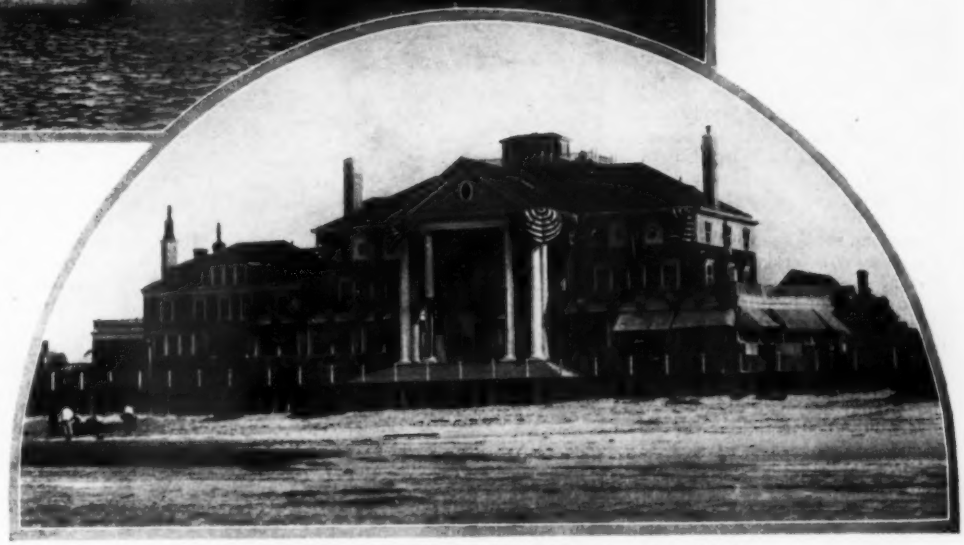
Clubs make possible at a small and reasonable price what would be almost impossible, or at least only possible at a very high and prohibitive cost, without the club. Those members who give their time and experience without charge to the club, reduce the members' expenses sometimes as much as 80% from what they would be required to pay for a similar service elsewhere.

The clubs themselves have a great responsibility. They should be more than marine garages. They



Pier and Club House of the Detroit Yacht Club. This house will be replaced within the year by a new one costing a half million dollars

Stamford Yacht Club



Club House of the Atlantic Yacht Club, Sea Gate, N. Y.

should be more than paper organizations. Their officers should be more than mere figureheads who are looking for fame or publicity on account of their office. They should be workers, enthusiastic workers, who appreciate that they are the members' servants, to a certain extent, and that upon their efforts and their judgment much of the success of their club depends, as well as the success of the whole sport of yachting in their localities.

On the other hand, much rests with the individual member. The selfish person who thinks he is doing his full duty by mailing his check each time he receives his semi-annual dues notice, is contributing more to the failure of his organization than he realizes. Officers must have the members' co-operation to make a club successful. And the co-operation must be of the most active sort. The member who only pays his dues and lets his interest stop there, is taking out of the club at least three times what he puts into it in the form of his proportionate contribution to the club treasury.

Yacht clubs should be members of a national organization of clubs, and perhaps members of the local organization of yacht clubs if the particular local conditions warrant.

The American Power Boat Association is the only national organization of yacht clubs in this country. Then we have such local organizations of clubs as the Mississippi Valley Power Boat Association, the Interlake Yachting Association, the Delaware River Yachtsmen's League, the Detroit River Yachtsmen and others. All of these are organizations of clubs and not organizations of individual members, that is, the yacht clubs form the Association, and not the individual yachtsmen.

The national and local organizations are all doing good work which should be encouraged, and the best way for the yacht clubs to get back of this work is by joining. The amount of the yearly dues is but a trifle. There is much work which can be better accomplished by all the yacht clubs working together as a unit rather than separately, and it is these kinds of problems which the national associa-

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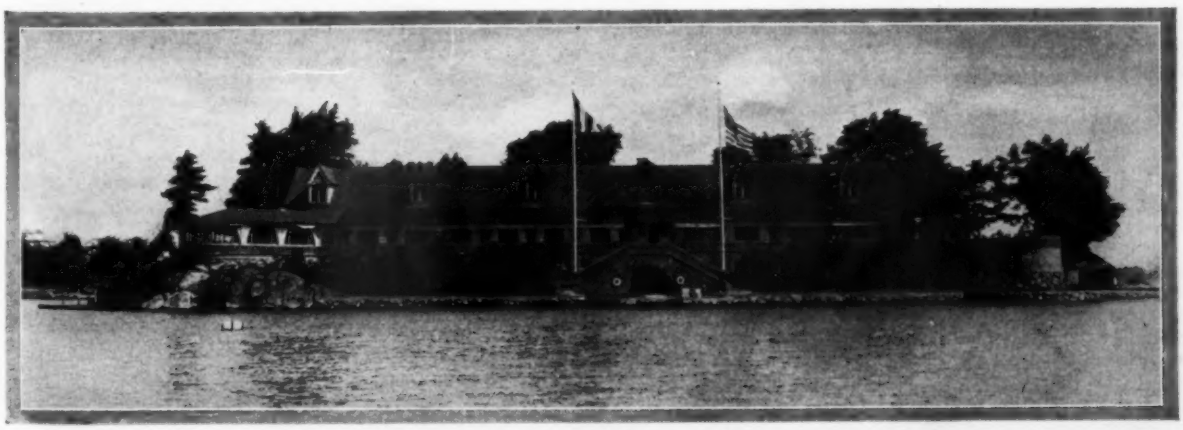


The beautiful home of the Thousand Islands Yacht Club, at Alexandria Bay

We Discover Solomon's Island

An Interesting Cruise Story Which Tells of Some of the Wonders and Charms of Chesapeake Bay—The Motor Boatman's Paradise

By Mrs. Ezra Bowen

EVERYBODY at Annapolis, from the captains in the harbor to our friend the Spanish Professor at the Naval Academy and the ice-cream cone man on Compromise Street,—everybody, the minute they heard we intended to go north, began to talk Solomon's to us.

"Oh, Professuh!" they would say reproachfully. "Sho'ly y'u ain' goin' no'th 'thout seein' Sol'mon's Islan'? Why, Cap'n, they ain' no place Down Eas' like Sol'mon's! Finest boats in that harbor y'u kin see anywhere; an' sof' crabs—my lan'! Y'u like sof' crabs, don't y'u, Miss?"

No one can be more persuasive than a southerner, but we held out for two weeks,—two weeks of scraping and painting and fitting out for that cruise up the Sound we had planned so carefully. The Captain, who is a college professor, says it is apparent I did not marry him for his money, so he is sure I married him for his vacations.

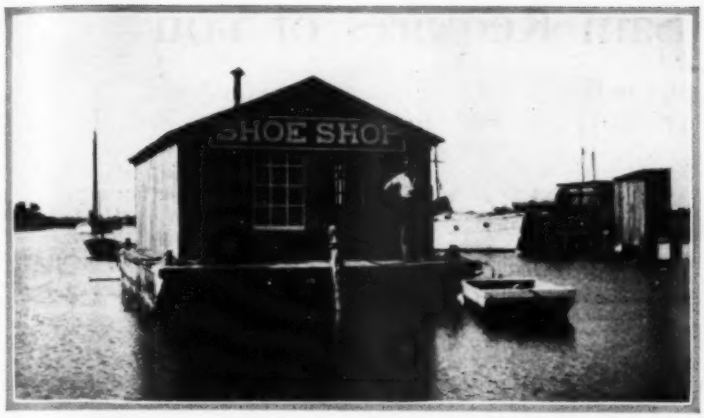
I think it was that about the sof' crabs that broke us. Anyway, we laid in an extra large frying pan and some olive oil for the cooking thereof, and on the first of July we pulled up anchor,

The Captain of C. D. B. attending to some light chores

rounded the lighthouse, and crept south along the western shore of Chesapeake Bay. Every river and every little bay tempted us to exploration, so that many days passed before we reached that port which spells perfection for the small cruiser.

It was one of those brilliant mornings with the sky clear and the Bay like a polished table top, when we sighted the Cove Point lighthouse,—fifty miles south of Annapolis and just around the corner from the Patuxent River, and Solomon's. I was steering; the Captain was below somewhere with the oil can. As I turned the wheel, the Captain's head popped up the hatch—the way it always does the minute I change our course. He seems to be able actually to smell direction. At first the sudden appearances used to startle me to such an extent that I was apt to reverse the wheel and run us aground, or something equally devastating. But the day we sighted Cove Point we had cruised together for seven odd months, and seven months aboard a thirty-foot boat will teach you a lot about your husband. So when he popped his

Three schooners went on the ways ahead of us



You don't have to go ashore to get your shoes mended at Solomon's

held a sheet rope could not fail to thrill at the sight of one of those sixty footers, loaded with sail, sweeping and circling as she makes her landing. With their leg of mutton sails, they are so light that a crew of three men and a boy—as like as not all of them as black as tar—can handle one easily. Few carry engines, but on a calm day one and all rely upon the powerful one-cylinder motor in the yawl boat to push them home.

Inside the steamer dock there are so many inviting places to anchor that it is hard to choose. You can go straight on up the Creek out of the life and bustle of the harbor and berth with the skipjacks under the shade of a tree, or you can sneak around behind Hellen's Island and be very private, or just settle right down near the dock as we did, and get acquainted.

After an exciting swimming party off the sandy beach of Hellen's Island,—there is always something exciting about the first plunge in strange waters—we went ashore, partly for exploration, but mostly for food, as supplies were getting low. We found a miniature bank, a miniature post office, and a labyrinth of wide, shady lanes lined with the rough, square, whitewashed houses of the sea captains. It was all very beautiful, and what is more, it was infinitely friendly, but search as we would, we could find nothing that looked like a place where you could buy milk, eggs and fresh vegetables. It's all very well, when you cruise for two weeks, to live on beans and bacon and Aunt Jemima pancakes, but on three months' cruise, you hanker after the vitamines; in fact, you want the kind of provender you get at home—with interesting variations. We had fallen in love with Solomon's, only, we sighed, to be driven away by threat of starvation. We decided to drown our sorrows in drink, and bought four bottles of pop, which we consumed under a tree on the bluff overlooking the harbor, with the fresh breeze blowing in our faces and the blue Patuxent below shining in the sun.

As the afternoon wore on, various individuals approached and affably engaged us in conversation. Some were black and some were white, but they had one characteristic in common—the bulging cheek, the slow rotary motion of the jaw and the serene expression that comes from the possession of a generous chunk of cut plug. They assured us that we would have no trouble in securing fresh food—"No, Suh; no, Miss; mos' ev'body in Sol'mon's has cheekens 'n a cow somewhah roun'. Y'u wait till tomorra; y'u folks won't have no trouble."

We waited, and at eight o'clock on Monday morning things began to happen. The Captain was below, and I was on my knees on the cockpit floor with a scrubbing brush. Over the scrunch of my scrub brush rose the Captain's

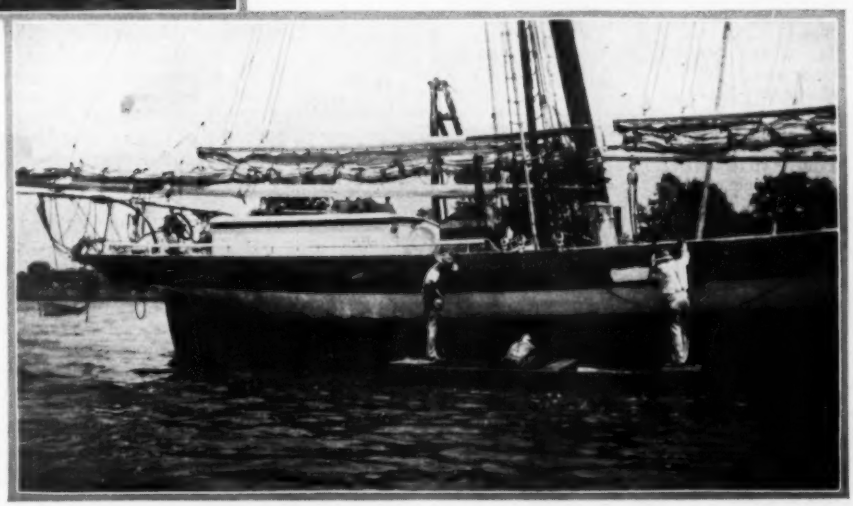
(*Continued on page* 64)

head up and shouted, "What's matter, Kate?" (in justice to the Captain, he never shouts except when he's been below with the engine) I merely nodded toward Cove Point and said calmly, "Oh, Sol'mon's!"

Ahead of us the blue Patuxent curled east away from the Bay, disappearing between a low strip of land which marked the farther shore and the high cliffs to our right, thick with evergreens. We slipped round the Point, and in a moment found ourselves inside the second lighthouse,

Various colored gentlemen viewed us from their little boats

where, under the shelter of those tremendous bluffs, lay a fleet of fishing schooners,—the rakish, clipper bowed Chesapeake bugeye that the Annapolis captains had bragged so much about. And the captains were right, these were glorious boats. They have not the endurance of the Gloucester schooners, they are bay craft,—but how they can sail! We motor cruisers have most of us been sailors in our day, but even those who have never



One of many similar boats which now use gasoline motors as an auxiliary

What Uncle Sam Requires of You

Many Regulations Surround the Use of Your Motor Boat—You Must Faithfully Comply With Them All In Order to Be Within the Law

AMONG the numerous provisions for the control of motor boats throughout the country, are laws regulating every phase of their conduct. They are required to be registered, to pay a tax both when they are built and when they are in service (with certain exceptions) and to navigate according to definite regulations. The equipment which they must carry is distinctly specified in the laws, and failure to comply with any of the many requirements will subject the offender to very severe penalties.

Numbers Required on Certain Boats

All boats except documented boats are required to be registered and to carry on each bow of the vessel where it can best be seen, the assigned number which belongs to that boat until it is lost or destroyed. Exception is made in the case of public vessels and boats under 16 feet in length when temporarily equipped with an outboard motor. A larger boat than this, when equipped with an outboard motor must be numbered, as well as the smaller boat when it is supplied with a permanently built in engine. The sale of a boat from one person to another does not change the registration number, but must be recorded within ten days and the ownership properly transferred. Documented boats and motor boats over 65 feet in length or 16 tons gross burden are not required to be numbered.

In order to secure a number for your boat it is simply necessary to apply to the Collector of Customs of the district in which you reside and request him to supply the application forms which are then returned to him properly filled out. A number will then be assigned to the boat which will vary according to the district. It will consist of a key letter to designate the district, followed by the numerical portion. The penalty for the violation of this law is $10.00, for which the vessel may be seized and proceeded against wherever found. The key letters for the various custom districts and the places where applications for numbers are received and issued are as follows:

Port	Letters Assigned	Port	Letters Assigned
Portland, Me.	AB	Louisville, Ky.	L
Boston, Mass.	CDE	Pittsburgh, Pa.	V
Providence R. I.	FG	Indianapolis, Ind.	K
Bridgeport, Conn.	HJ	St. Louis, Mo.	X
New York, N. Y.	*K	Des Moines, Ia.	H
Philadelphia, Pa.	LM	Omaha, Neb.	Y
Baltimore, Md.	NP	St. Paul, Minn.	Z
Norfolk, Va.	RS	Pembina, N. D.	J
Wilmington, N. C.	T	Great Kills, Mont.	G
Charleston, S. C.	U	Cleveland, Ohio	N
Savannah, Ga.	U	Detroit, Mich.	PR
Tampa, Fla.	VW	Chicago, Ill.	ST
St. Albans, Vt.	X	Milwaukee, Wis.	W
Ogdensburg, N. Y.	Y	Duluth, Minn.	U
Rochester, N. Y.	Q	Los Angeles, Cal.	A
Buffalo, N. Y.	Z	San Francisco, Cal.	BCDEF
Mobile, Ala.	A	Portland, Ore.	GHI
New Orleans, La.	BC	Seattle, Wash.	KLM
Port Arthur, Tex.	D	San Juan, Porto Rico	FG
San Antonio, Tex.	F	Honolulu, Hawaii	XY
Memphis, Tenn.	M	Juneau, Alaska	XY

* Numbers will be awarded up to 9,999 without a letter. Additional numbers, if required, will be used in connection with the letter K.

Usage Tax

The last session of Congress modified Section 1003 of the Revenue Act to the extent of relieving the tax burden imposed upon the small boat user in particular. The requirement for a usage tax payment for all boats under 32 feet in length or under five net tons was eliminated. All pleasure craft other than those which fall within the classification just mentioned are liable to this tax which will vary according to the size of the boat. Those boats which heretofore paid a usage tax at the rate of $10.00 per year can in general be considered to be in the class which is now freed from tax requirements. Larger boats, those from 32 feet to 50 feet in length, must still pay a tax at the same rate as previously, which is at the rate of $1.00 per foot of length. For larger vessels still, those from 50 feet to 100 feet in length, the tax remains at the same rate of $2.00 for each foot of length. Any vessels which exceed 100 feet in length are taxed at the rate of $4.00 per foot of length.

The proper place to pay this tax is familiar to everyone. It is the office of the Collector of Internal Revenue which attends to this little formality. Everyone has just sent in his little income tax return to his office, and the memory of this will still be fresh. As there were many temporary offices established on account of the income tax payments, it is best to go directly to headquarters for the boat tax. This will generally be found in the Customs House.

All yachts, pleasure motor boats, and sailing boats of over 32 feet and over five net tons are liable to this tax, unless used exclusively for trade or fishing. The classes exempted are: (a) Boats used exclusively for trade or fishing; by trade is meant carrying property or persons in trade and not for pleasure, or used by the owner in the conduct of his business; for fishing is meant as a means of business or livelihood. (b) Boats used exclusively for national defense; or (c) If built according to plans and specifications approved by the Navy Department. The taxable period covers the fiscal year of the revenue department and runs from July 1 of each year to the following June 30. The tax is payable on or before July 1 and also on or before the last day of the month in which the purchase is made in the case of the original purchase of a boat. A return must be made annually by all boats, irrespective of whether the boat is or is not taxable. In the case of original purchase of a boat at any time subsequent to July 1, the tax for the first year shall be computed for the number of calendar months, including the month of sale remaining prior to the following July 1. In all other cases the tax shall be computed for the full period of twelve months. If a boat is leased or chartered for the entire taxable period ending the next following June 30, the lessee or charterer of the boat is required to make a return and, if necessary, pay the tax.

Equipment Required on Pleasure Boats

The items of equipment which must be carried by the various classes of motor boats whenever they are under way are as follows:

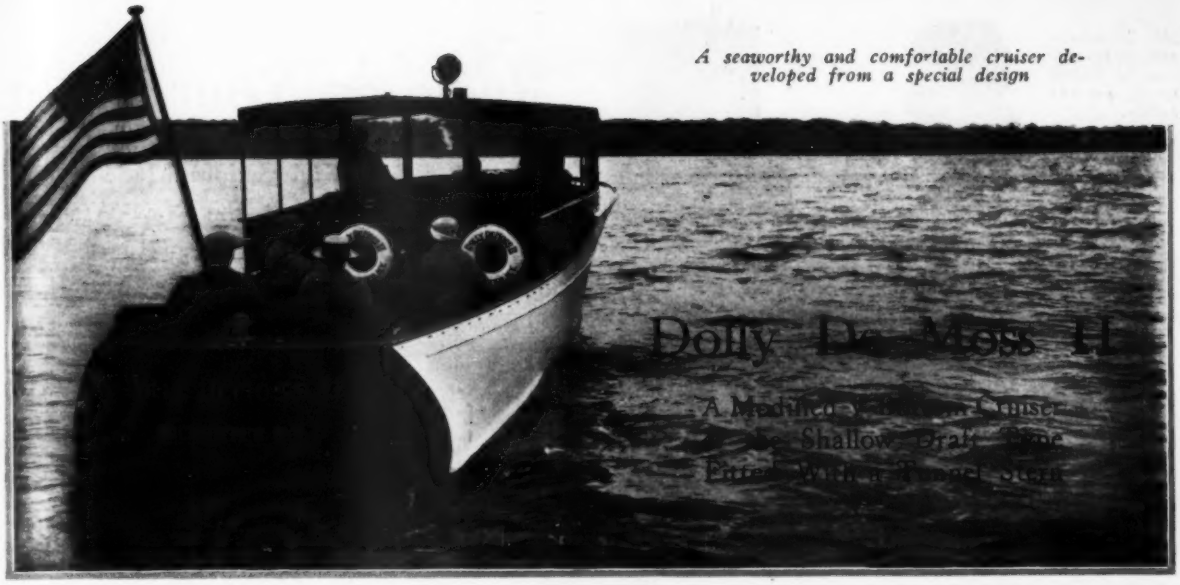
Class I—Boats under 25 feet, L. O. A.
- Lights—White forward light (lens at least 19 square colored side lights) and stern light.
- Sound Apparatus—Whistle capable of producing blast prolonged for at least two seconds.

Class II—Boats 26-40 feet, L. O. A.
- Lights—White forward light (lens at least 19 square inches); white stern light; green starboard light; red port (lenses at least 16 square inches); screens at least 18 inches long; lenses, fresnel or fluted glass.
- Sound Apparatus—Same as Class I, plus fog horn and bell.

Class III—Boats 40-65 feet, L. O. A.
- Lights—Forward light with lens at least 31 square inches; white stern light; green starboard light; red port light (lenses at least 25 square inches); screens at least 24 inches long; lenses, fresnel or fluted glass.

All Classes—One life preserver for each person on board. Life preservers, life belts, buoyant cushions, ring buoys, or similar devices in sufficient number for every person on board, and placed so as to be readily accessible. Life preservers or buoyant cushions must be capable of keeping afloat for twenty-four hours a weight exerting a direct downward pull of twenty pounds, on boats not carrying passengers for hire. No pneumatic life-saving appliances or appliances filled with granuated cork will be permitted.

(*Continued on page 82*)



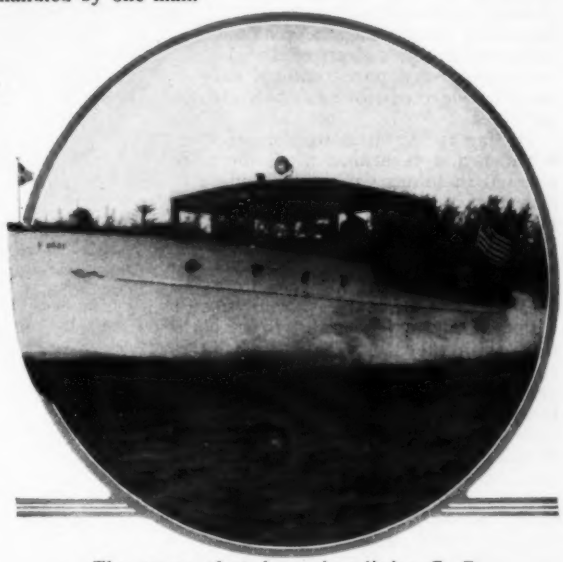
A seaworthy and comfortable cruiser developed from a special design

PROMINENT among the new cruisers seen at Florida this winter is Dolly De Moss II, a 40-foot shallow draft express cruiser completed early in the winter by the Great Lakes Boat Building Corporation at Milwaukee, Wis. The boat was shipped by rail to Palm Beach about the first of the year and was immediately launched and placed in active service. Her owner, Lucius W. Robinson of Rochester, N. Y., has used her continuously since then at his winter home at Hobe Sound, Florida, and has been so well pleased with the boat that it has had very little rest since its arrival in the south.

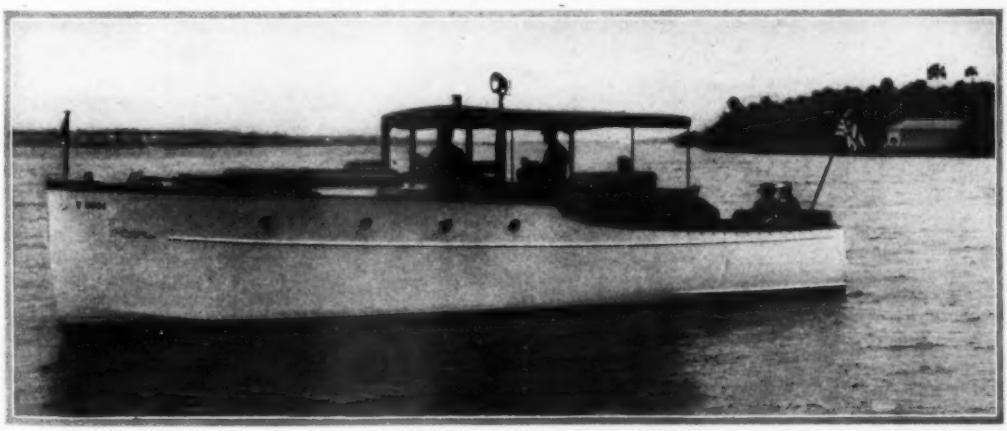
This boat was especially designed and built by the Great Lakes Boat Building Corporation to produce a seaworthy and comfortable express cruiser. Particular attention was given to the matter of ample accommodations for extended cruising, and at the same time the speed qualities were not overlooked. The bulk of Florida cruising is done on waters of relatively shallow depths. In order to navigate these safely, the boat was built to enable her to travel in shallow water. By reason of this feature, the draft has been kept to 24 inches, and the bottom construction is of the modified V-bottom type with a semi-tunnel stern.

The purpose of the boat is largely comfortable day cruising, and the arrangement plan provides in the natural mahogany main cabin, sufficient accommodations for the party. The seat arrangement is worked out to provide four separate berths at night. These are all of the box spring type handsomely upholstered. In the galley will be found the usual lockers, dish racks, ice box, sink, and range. On deck, ample space has been provided and a comfortable thwartship seat occupies the after end of the bridge deck. Lazy back seats across the back of the cockpit and comfortable wicker chairs complete the seating equipment.

In order to produce the required speed of 22 m.p.h., the builders have fitted the boat with a model G.R. six-cylinder Sterling marine engine. As is customary in boats built by this company, the entire control is centered in the steersman's position on the bridge deck so that the boat can be handled by one man.



The power plant is a six-cylinder G. R. Sterling motor and is able to drive the boat 22 m. p. h. without effort



Dolly De Moss II, a 40-foot Great Lakes shallow draft express cruiser, has been provided with ample accommodation for extended cruising

All the necessary apparatus can be placed on a small table.

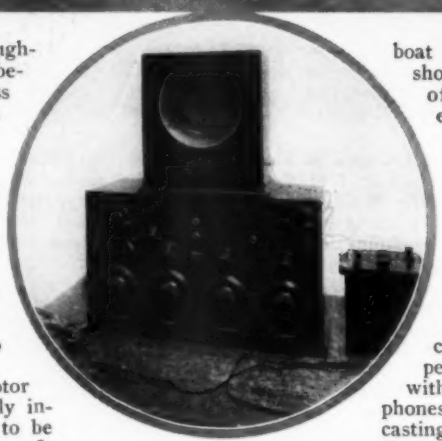
Radio on Your Yacht

Rapid Strides Made in Developing the New Art—Its Value and Advantages When Installed on the Motorboat

By *Wm. J. Jorgensen*

Photographs by M. Rosenfeld

MEN in every walk of life throughout the entire country are beginning to realize that wireless is no longer a mysterious field of dots and dashes requiring technical knowledge. They know that radio telephony is becoming a commercial possibility and are greatly interested in following the progress of this rapidly advancing art. Already the wonder of yesterday is becoming the prosaic, the commonplace of today. Most of the big newspapers are now running daily columns devoted to news of radio activities.



A combined receiver and amplifying unit of larger size with loud speaker

By far the greatest number of motor boatmen and yachtsmen are sufficiently interested in things new and scientific to be also attracted by the wonders of radio. It is entirely feasible to equip any cruising boat with a suitable radio apparatus to enable it to keep in touch with the activities of the world at practically all times. This does not mean, of course, that the small boat can be supplied with transmitting apparatus to enable it to hold conversations with the folks at home or with other boats at a distance. It does mean, however, that the cruiser may enjoy a continuous round of entertainment which is being freely distributed through the air from numerous large stations. The receiving apparatus which will bring this to the ears of the listener, is relatively simple and, owing to the absence of surrounding structures, the signals can be received with greater freedom on the boat than under similar conditions on shore. Salt water, on which the bulk of our yachting is done, forms a most excellent ground, and the rigging of the aerial equipment is also a relatively simple operation.

At the present time it is estimated that there are about 500,000 radio telephone receiving sets in operation in the United States. A large portion of these are equipped with a device called amplifiers. By means of these, the received signals may be magnified and their volume increased to such an extent that all persons on a boat are enabled to hear without being required to use headphones. From a large number of broadcasting stations throughout the country there are being sent out at definite intervals current weather reports, news items, market quotations, time signals, special entertainments for children, concerts, dance music, speeches, sermons, orchestral recitals and musicals. News to suit all tastes.

For so valuable an asset, its cost and upkeep is trifling. As an entertainer it outranks the phonograph, as an educator it is most far-reaching, and as a commercial possibility it is without equal.

The operation of these sets is a very simple matter. Too simple to be complicated by technical terms and descriptions. Just a few wires on the mast. Your machine. Your equipment. A glance at the paper to see what the program will be. Adjust the receivers and the world opens before you without effort.

Aerial equipment is readily installed on the average cruiser. The sea forms an ideal ground circuit

The Financial Side

Proof That It Is Cheaper to Roam thé Restless Sea Than to Support a Restless Landlord—How to Ward Off Starvation When Cruising

By Alfred F. Loomis

SOME mention was made the other day of the cruise which I hope to take in Hippocampus next summer, and the friend to whom I was speaking asked, "How can you afford the time for these long cruises?"

In this question substitute for the word "time" the word which my friend was too delicate to mention—"money"—and you have the question which strikes closest to every man who contemplates a long cruise. How much will it cost?

The correct answer is a converted epigram: "It is cheaper to cruise than to pay rent." This is the literal, unvarnished, and weather-stained truth. If you have an auxiliary sailboat or motor boat, and cruise for the sake of cruising rather than for the indulgence of the speed microbes in your veins, it costs less to roam than it does to stay at home.

Now, I know from past experience that whenever an unqualified assertion of fact is made in these columns, some outraged reader of MoToR BoatinG shinnies up the mast, waves a distress signal, and shoots over a message to refute me. So to disarm criticism, let me make a number of reservations before going on with my article.

1. It is not cheaper to go off in a steam yacht than it is to remain at home.

2. If an unrented apartment or suburban mansion figures in the calculations, it may be less expensive to remain in it than to seek relaxation on the sea.

3. If the interest on the money in the boat and her insurance are permitted to fog the detail, my assertion may not apply.

4. If the cruising party develops the picture postcard habit and aggravates it with an addiction to expensive shore dinners, I am an unmitigated liar.

These exceptions being taken, let us get under way on the original orders.

Overlooking Gatun Locks, with the Atlantic entrance to the Panama Canal in the background

Drawbridge and entrance to Jagua Castle, a moated Spanish fortress in Cienfuegos, Cuba

What It Costs to Cruise

Last spring when Hippo started off with Squibb, Chambers, $60 worth of groceries, and myself aboard, it looked to

En route in Hippocampus, her crew did little fishing at sea

The little Hippo, photographed from the top of a sea buoy

all hands as if it might be an expensive venture. You can buy $60 worth of groceries in ten minutes and stow them in another ten; and we thought it might work out that we would consume the remainder of a half hour in laying the whole amount over a sea-going appetite. But this was not the case. When the cruise ended in August there was still $10 worth of the original item left.

I don't want to be misunderstood, and there is no implication in the above statement that for four months we subsisted on $50 worth of food. As a matter of fact, we spent an additional $365 for ship's stores during the months of May, June, July, and August. But of the original order, there was something more than a ten-dollar bill represented in canned salmon, tuna, and sardines, and Chambers simply wouldn't eat fish. But of this, more later.

Dealing solely in cost figures for the moment, we consumed or surveyed as unusable within a few cents of $425 worth of food, paints, varnish, small parts, etc. This, being divided into four months, figures out to $106 per month, and being again divided by three, the crew number, results in $35 per month per man.

In what select boarding house in any large city can you obtain board and lodging for $35 a month? What fortunate family of three can spend a month in a resort where there is an unlimited abundance of fresh air, swimming, motor boating, and sailing for the sum of $106? The answer is the same in both cases.

I should be something less than truthful if I declared that none of us spent more than $35 a month for cruising expenses, for this figure pertains only to what was consumed aboard ship. Arriving in port, we did as every cruising party does—surrounded a shore meal; and again and again we ate three meals a day which were not of our own cooking. These shore meals were paid out of our

Stowing a month's supply of stores before launching in New Rochelle

individual pockets and did not figure in the ship's expense account.

They materially increased the expense of cruising, but they were extras of the same sort that the boarding-house wight indulges in when he buys a square meal in a restaurant. Moreover, we bought films and plates, had our pictures developed, sent cables, and generously gratified our passions for souvenirs, clothes, and other incidentals. If, however, such extras as these are all charged against the cruising account, it is still cheaper to cruise than to pay rent.

The gasoline item I have included in the figures given above. It amounted to $60 for the entire cruise, and gave us a mileage under power of 600 out of the total 3,000 miles between New York and Panama. This is one-fifth of the distance made good, and is the one-fifth that counted most—the part, that is, occupied in entering or leaving harbors and rivers and in frustrating calms. In an auxiliary the fuel bill is variable; it is more if a definite schedule must be maintained, and less if more dependence is placed in the sails.

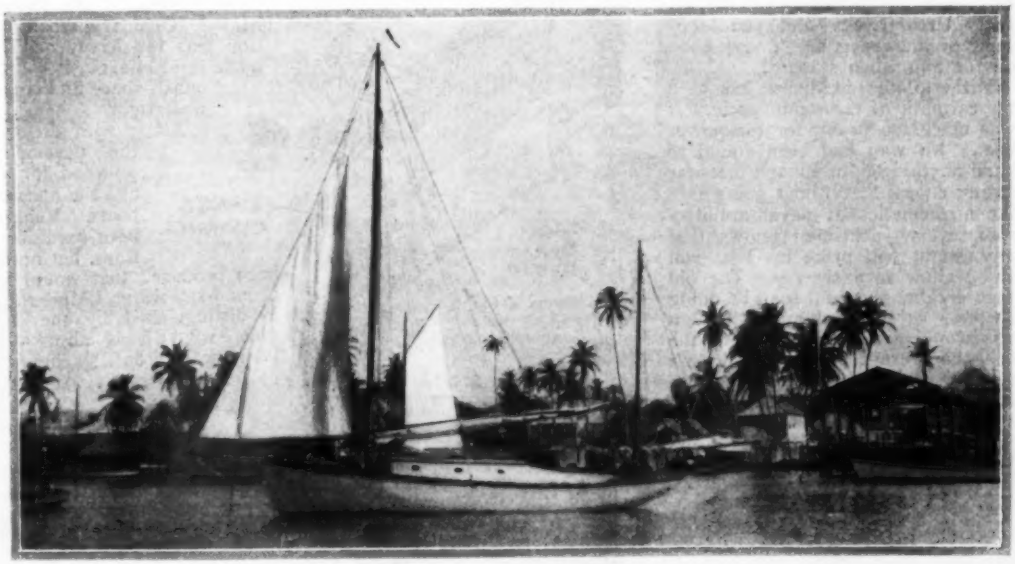
Chambers' Aversion to Fish

Now, as was said above, the able first lieutenant of Hippocampus had a thorough aversion to the finny tribe, whether found in cans or in the sea. And as any bill-of-fare has to be selected to tickle the palates of all hands, we partook of but little fish. Occasionally Squibb and I divided a can of salmon while Chambers enveloped a couple of eggs, but in the main, living on canned goods, we opened only those tins which would be acceptable to all.

It is a curious fact about cruising that if one man in a crew dislikes any article of food, it will, by tacit consent, be stricken from the menu. Squibb had a thoroughly cosmopolitan taste and I do not recall that we gave up anything because he disliked it, but we eliminated on Chambers' account the serving of sea food, and on mine, the dispensing of coffee, tea, and cocoa.

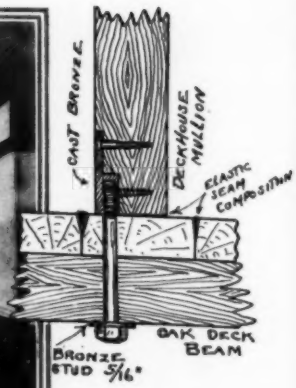
Ashore I drink coffee three times a day, and on occasion dive to the bottom of a cup of cocoa in order to salvage the marshmallow. I swing a wicked tea cup, and have even been known to lisp "yes" to the invitation of a flask-toter. But afloat I am abstemiousness itself. The result of my abstention was that neither Paul nor Al bothered to make coffee or tea for two and it went unmade. Occasionally, Paul could contain his appetite for delicacies no longer and concocted a cup of cocoa from a villainous-looking tin that had suffered from the ravages of kerosene and salt water, but for the most part we quenched our thirst with the juice of limes squeezed into water.

(*Continued on page* 100)



Hippo drying her jib at the Royal Jamaica Y. C. anchorage, Kingston

Interior of Kex's deckhouse, showing entrance to quarters below



Method of attaching mullions to the deck beams

Exterior of the deckhouse viewed from forward

The Deckhouse—A Necessity

With the Development of New Materials, Deckhouse Construction Can Be Made Both Light and Durable

By Frank Pembroke Huckins

THE deckhouse is an evolution of the pilot house and is younger brother to the closed car. Until recently the skipper of the small power yacht stopped the spray with the top of his head and proved that oilskins weren't watertight and found that wet rubber boots never dried out inside. If he was not red-blooded enough to run in bad weather, he sat down below in a stuffy cabin, smoked too much, got peevish and took it out on his wife. Then he turned to experiments with spray shields and dinky steering shelters, but these still kept the rest of the party below decks—and you know some of the guests aren't very good on the aim when seasick!

Hitherto, the deckhouse has been the earmark of the steam yacht. It was much too heavy for the power boat. No way had been found to build anything light enough that was strong enough. Without going into the mathematics of naval architecture, every yachtsman knows that top weight will make his boat roll and wallow in a seaway. The old time deckhouse would soon be doing business as the keel and, although this would give a nice view of the fish, the average power boat doesn't run very well bottom up. He also knows that anything he sticks up on deck square in the teeth of the weather has a habit of starting west at the most disconcerting moment unless it is strong and well tied down. Metal for a deckhouse is out of the question. Anything thick enough to stand the strain is too heavy. Ordinary wood construction was too heavy or, if it was made light enough, it soon warped out of shape and ceased to be watertight.

Along with the war came the development of plywood for airplanes and the hulls of flying boats. Veneers had been used for generations, but nothing had been produced that would stand up around salt water. Modern plywood is distinguished by the glue, which is absolutely waterproof, by the

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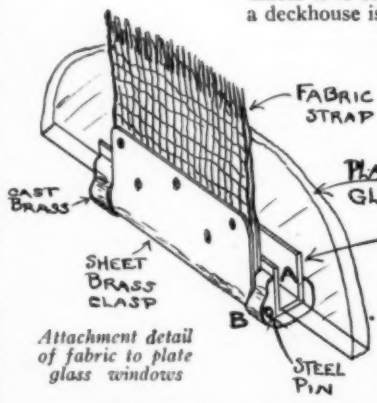
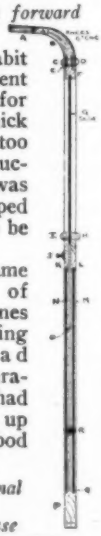
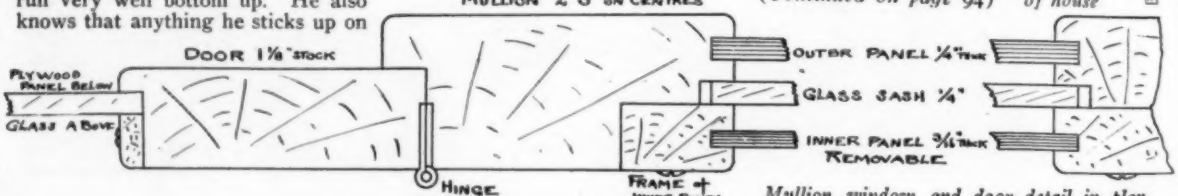


Attachment detail of fabric to plate glass windows



Sectional detail of house



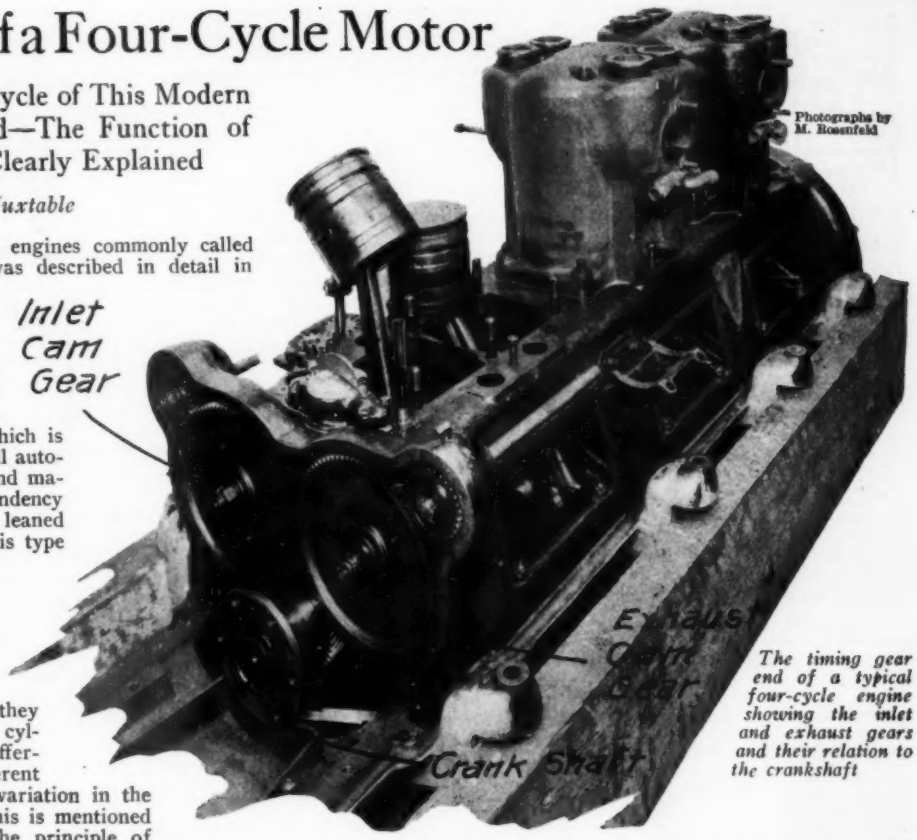
Mullion, window, and door detail in plan

The Why of a Four-Cycle Motor

How the Operating Cycle of This Modern Machine Is Arranged—The Function of Its Many Parts Clearly Explained

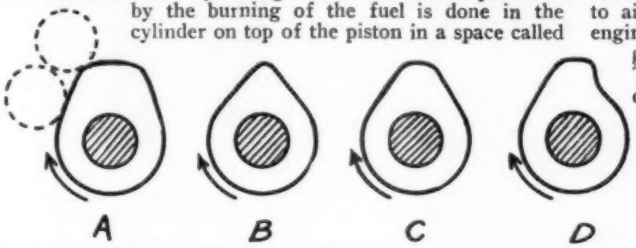
By L. Huxtable

THE form of marine engines commonly called the two-cycle type was described in detail in the previous issue of this magazine and the description which follows will cover the four-cycle type in a similar manner. This type of machine more correctly called the four-stroke-cycle is the type which is now in use in practically all automobile, tractor, airplane, and marine service. The recent tendency in gas engine design has leaned more and more toward this type and even in low powered installations it has become the favorite due to its flexibility and greater economy. All engines of this type operate on practically the same principle, even though they may have a multiplicity of cylinders and be fitted with different kinds of ignition, different valve arrangements, and variation in the shape of the castings. This is mentioned merely to explain that the principle of operation is identical even though the details of construction are varied.

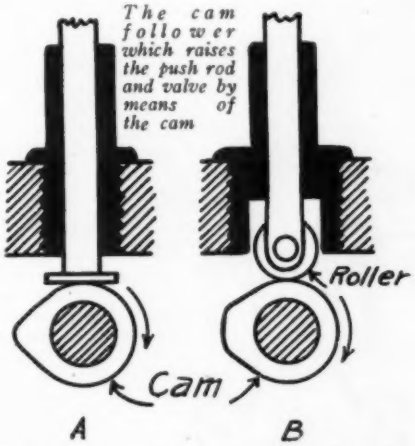


The timing gear end of a typical four-cycle engine showing the inlet and exhaust gears and their relation to the crankshaft

In the four-stroke-cycle engine all of the work produced by the burning of the fuel is done in the cylinder on top of the piston in a space called the combustion chamber. When a mixture of gasoline vapor and air is set on fire it burns with great rapidity and produces an intense heat. In burning this mixture expands rapidly and develops a pressure against the head of the piston. The combustion of a gasoline vapor mixture is so rapid that it is usually spoken of as an explosion. This is the term most frequently used although combustion is more correct. The difference between the two is that an explosion is instantaneous while the combustion of the gasoline mixture is not instantaneous although it is exceedingly rapid. An appreciable variation in the rapidity of combustion can be introduced by varying the proportionate volumes of gasoline vapor and air which are drawn into the cylinder. A rich mixture or one in which the proportion of gasoline to air is excessive, or about one to seven, will slow the engine down. A lean mixture is one which is deficient in gasoline, proportions approximately one to twenty. This will cause back firing and lack of power. The correct proportion or air and gasoline is about fifteen parts by weight of air to each unit of gasoline.



Typical cam profiles designed for rapid opening and closing of valves



A typical camshaft for a four-cylinder L-head motor with one camshaft

The ignition of the gas mixture is caused by a spark or flame and this should occur at such a time in the cycle that the greatest pressure is exerted on the piston head when it is near the top of its stroke. This position is designated as the top dead center. As a result of the pressure on its upper surface the piston is caused to slide down the length of the cylin-

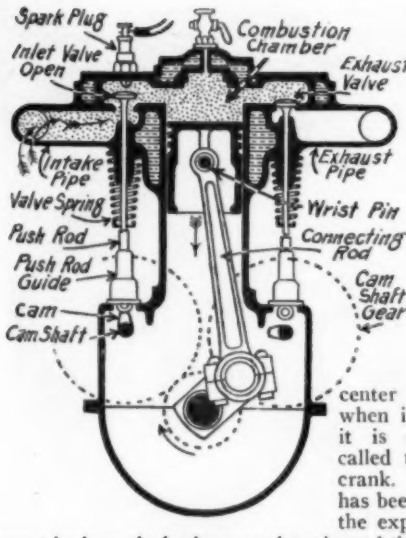


Diagram which represents the beginning of the suction stroke with the intake valve open

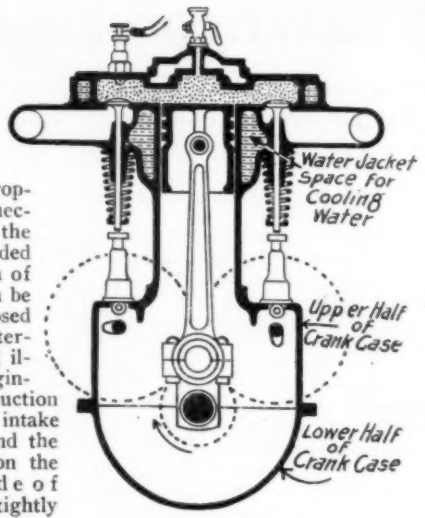
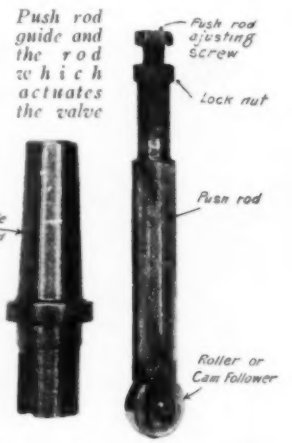


Diagram showing the end of the compression stroke with the gas charge fully compressed, valves closed

der from the head toward the open end. This movement is called one stroke of the piston and is limited by the distance between the center of the crank pin when it is up and when it is down, commonly called the throw of the crank. After the piston has been forced down by the explosion pressure it must be brought back upward again and this is accomplished by means of the inertia of the fly wheel. The first downward motion of the piston caused by an explosion starts the rotation of the fly-wheel, and once it is started it will continue to revolve until friction or some external force stops it. Before it can be stopped, however, a succeeding explosion occurs giving an additional impulse to the wheel thus keeping it in motion.

Standard forms of cage and ordinary type valves

It requires four strokes of the piston to complete the series of events called a cycle; these are—the suction stroke which introduces the gas vapor into the cylinder, the compression stroke which compresses the vapor so that the explosion will be more violent, the power or impulse stroke in which the vapor is burned within the cylinder and the exhaust stroke in which the products of combustion or burned gases are expelled from the cylinder. These four strokes are called briefly the suction, compression, power, and exhaust, and occur in turn in each and every cylinder of the engine. The diagrams which illustrate the different phases of the four-stroke-cycle are numbered figures 25, 26, 29, and 30. In order to permit the succession of events to follow each other in proper order it is necessary that the engine be provided with some form of valve which can be opened and closed at definite intervals. Figure 25 illustrates the beginning of the suction stroke with the intake valve opened and the exhaust valve on the opposite side of the cylinder tightly closed. As the piston moves down in the cylinder the gas charge is drawn in past the valve and the entire volume filled with the charge. Figure 26 shows the cycle almost one full turn later and it will be noted that both the intake and the exhaust valve are closed, while the gas charge which previously filled the entire cylinder volume has been compressed into the relatively small space between the top of the piston and the inner top of the cylinder. Its pressure has been increased from that of the atmosphere to a matter of 35 or 40 lbs. per square inch. All openings by which the gas might possibly escape are tightly sealed in order to prevent the loss of this pressure. When engines become old and worn the gas will leak by the piston rings and valves causing a noticeable loss in efficiency. An approximate test for the condition of the gas engine is a test of its compression. An engine which has no compression, as the popular term is, can generally be considered to be in poor condition. An engine to be in first class order must be so tight that when the fly-wheel is rotated by the hand the compressed air in the cylinder will cause it to rebound sharply and also will retain the compressed air for an appreciable time without noticeable loss.



Push rod guide and the rod which actuates the valve

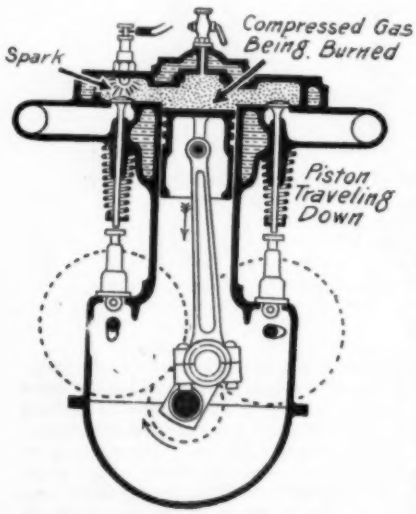


Diagram representing the beginning of the power stroke after spark has taken place

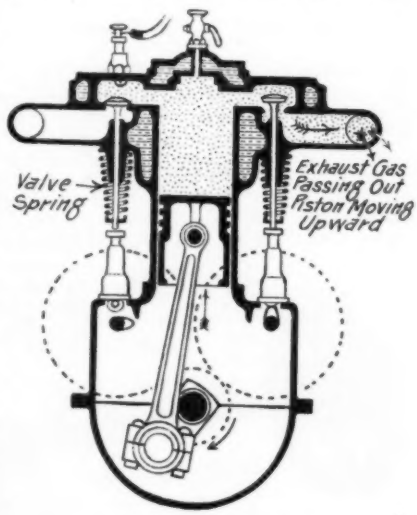


Diagram at beginning of the exhaust stroke with exhaust valve open

(*Cont. on p. 62*)

Names of First Students To Pass Entire Thirteen Lessons In MoTor BoatinG Correspondence Course and to Receive Pilot's Certificate

Morton B. Stelle	Vincent Francis	L. E. Wilson	R. Andren
F. B. Smith	Frank O'Beirne	C. S. Young	Arthur Ek
Dr. J. Francis Schefcik	H. A. Nelson	Dr. H. E. Watkins	Percy S. Benedict
J. K. Sexson	Edward O. Beirne	J. Calvert	John C. Brodhead
W. B. Landreth	W. G. Boyden	Leslie H. Chapman	H. J. Hodgdon
Charles E. Grush	Henry Byers	L. L. Crosthwaite	C. E. Wilson
W. C. Gustafson	Joseph Bister	Clarence W. Culver	Stanley C. Wilcox
Albert J. Fenton	William O. Yates	I. S. Ellsworth	H. T. Zachgo

Correspondence Course Pilot Certificates Are Awarded

Several Students Successfully Pass All Thirteen Lessons— Questions For Lesson No. 2 of the Dead Reckoning Course

THE first MoToR BoatinG Pilot Certificates have been awarded. The first complete reports which have come in from the examiners show that 32 students have successfully passed the thirteen Correspondence Course lessons with a rating of 80% or better. More than 100 persons have already passed all lessons except one. Of this number, there are many whose thirteenth lesson has not been as yet passed upon by the examiners; others have as yet failed to send in answers to one lesson, while a few of them have failed to reach the required passing mark of 80%. Those who have failed in one or more lessons have the privilege of submitting another set of answers if they so desire. We shall be very pleased to return to those students who have failed any particular set of answers on which they did not come up to the required standard.

Many answers to Lessons No. 2 to No. 13, inclusive, have been reaching us daily during the past month. The names of those additional students who pass all the thirteen lessons will be printed in subsequent issues of MoToR BoatinG. As soon as possible after each student successfully passes the entire thirteen lessons, his Pilot Certificate will be made out, and after it has been signed by three of the examiners and the Editor of MoToR BoatinG, will be forwarded to him.

NAMES OF EXAMINERS WHO HAVE PASSED UPON ANSWERS SUBMITTED BY THOSE ENROLLED IN THE CORRESPONDENCE COURSE

Dr. A. B. Bennett, Washington, D. C.; H. A. Jackson, New York, N. Y.; Sigmund Cohn, New York, N. Y.; Milton N. Price, Baltimore, Md.; Theodore I. Coe, New York, N. Y.; Frank P. Huckins, Boston, Mass.; John K. Murphy, New Haven, Conn.; G. W. Schaeffer, Chicago, Ill.; Dean Potter, New York, N. Y.; H. M. Williams, New York, N. Y.; Walter Groszman, Bayside, Long Island; A. B. Duryee, New Rochelle, New York; F. T. Lander, New York, N. Y.; A. B. Dessow, New York, N. Y.

In this issue of MoToR BoatinG on page 37 will be found the correct answers to the questions on Lesson No. 2 of the Course in Piloting, Seamanship, and Small Boat Handling. This lesson was on lights for the various classes of boats.

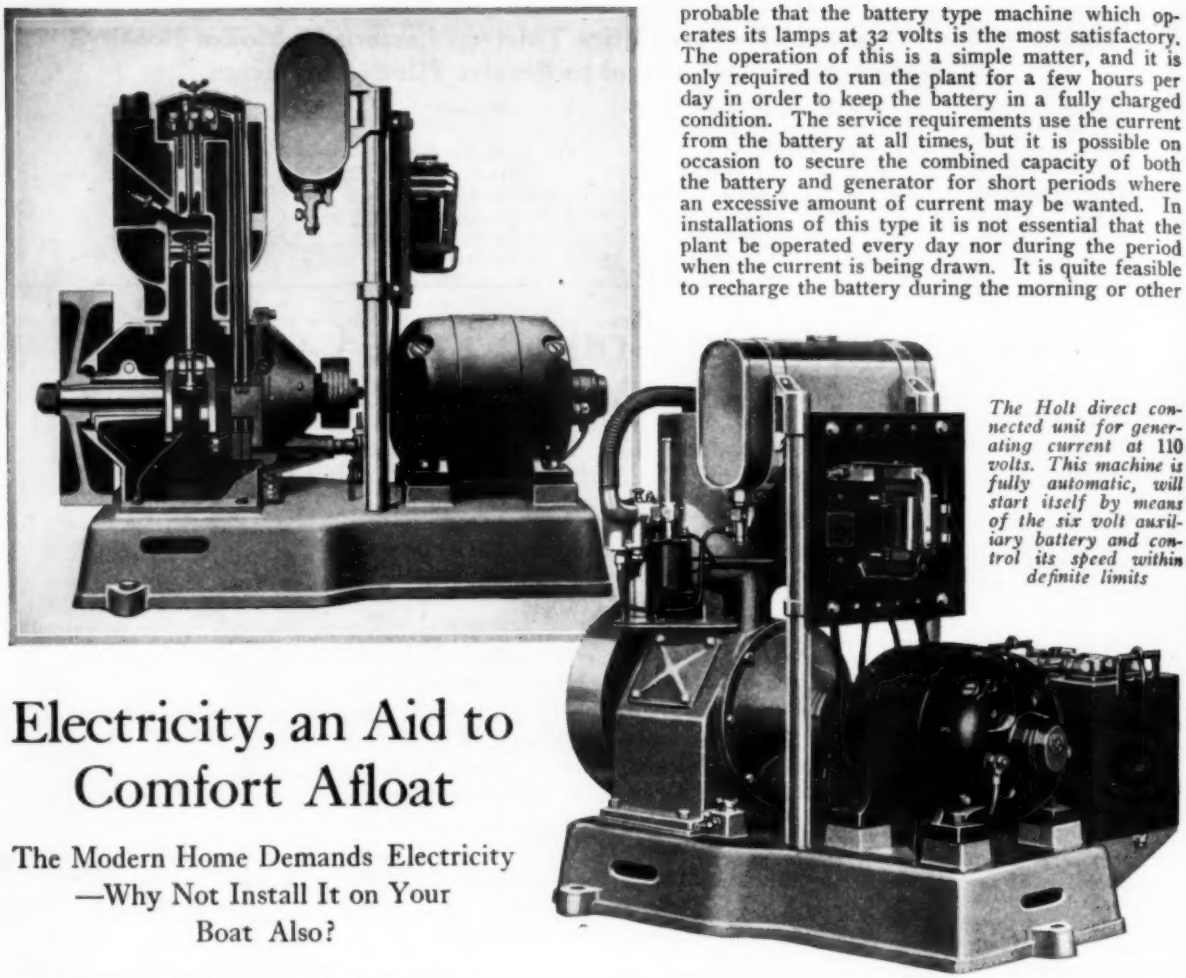
In the June issue of MoToR BoatinG, we will publish the correct answers to Lesson No. 3 of the first Correspondence Course. In the July issue, Lesson No. 4 will be reviewed and the correct answers given. In this way, we hope to review the entire course.

The first Correspondence Course in Piloting, Seamanship and Small Boat Handling is still open, and answers may be submitted to Lessons Nos. 3 to 13. Those who have failed in any of the lessons of the first course, with the exception of Lessons Nos. 1 and 2, still have the opportunity of trying again and submitting new answers to those lessons in which they have failed. Always remember to place your name and address on all papers submitted.

The names of those who successfully passed papers submitted during March will be found on page 114

Questions On Lesson No. 2 Dead Reckoning Course

1. What is the dead reckoning triangle?
2. What geographic lines form two of its sides and what represents the third side?
3. In what directions do the respective sides run?
4. What dead reckoning terms are applied to the several sides?
5. Where is the course angle?
6. How many points in the angle represented by the following courses: (a) S E x E ¼ E; (b) N N W ½ W; (c) W ¾ S?
7. Express in points the following Navy compass courses: (a) 216°; (b) 79°; (c) 349°.
8. How many degrees in the angles which would be used in solving the dead reckoning triangles, if the courses (Navy style) were (a) 137°; (b) 299° (c) 270°?
9. How many parts does a triangle have and what are they?
10. What are the opposite and adjacent sides?
11. What is the complement of an angle?
12. How many degrees are contained in all the angles of a triangle?
13. What are similar triangles?
14. What is the relationship between the corresponding sides of similar triangles?
15. What effect will increasing or decreasing any side of a triangle have upon the other sides, provided the angles are not changed?
16. What are functions of an angle?
17. Between what sides of a triangle does (a) the sine, (b) the cosine, and (c) the tangent, express the proportion?
18. Give the formula representing (a) the sine, (b) the cosine and (c) the tangent?
19. The hypothenuse of a triangle is 10, the adjacent side 8, and the opposite side 6 inches. What would be the length of the hypothenuse and adjacent sides of a similar triangle whose opposite side is 12 inches? Will the functions of the angles of the two triangles be the same, or different?
20. A vessel sails, course 133°, Dist. 279 miles. What is the diff. Lat. and Dep. made good?
21. Point A is 139 miles S W x S of point B, what is the the Diff. of Lat. between them? How far is A west of B?
22. A vessel sails a Dist. of 218 miles in a generally southwesterly direction and makes good a Dep. of 137 miles West, what is the Course and Diff. Lat. made good?



The Holt direct connected unit for generating current at 110 volts. This machine is fully automatic, will start itself by means of the six volt auxiliary battery and control its speed within definite limits

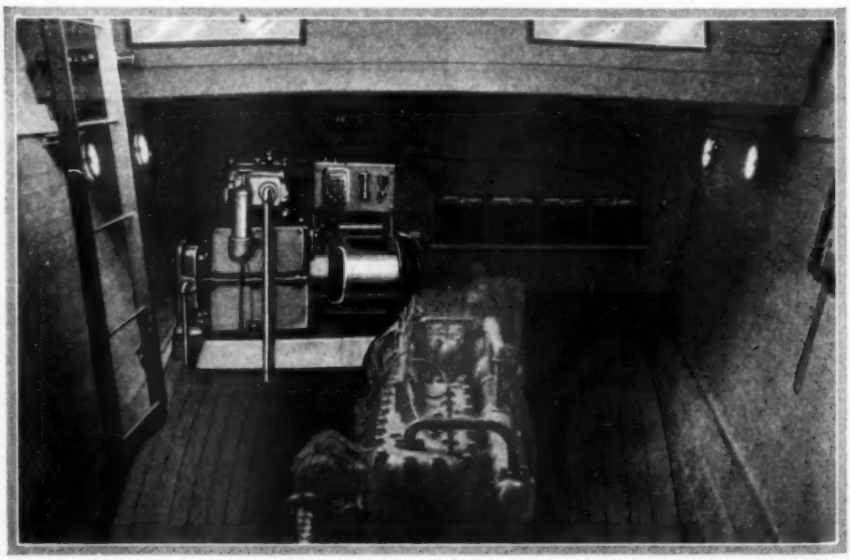
Electricity, an Aid to Comfort Afloat

The Modern Home Demands Electricity —Why Not Install It on Your Boat Also?

ELECTRICITY has come to be regarded as one of the essentials of modern civilization. Few homes today are not supplied with electric current for domestic purposes, and those which are not, are being rapidly converted to its convenience. There is no reason why the comfort of ample electric power cannot be made available for use on board the motor boat and yacht in exactly the same fashion. It is the simplest operation to install a small generating unit which will supply ample current for all requirements. Beginning with the smallest boat which can be lighted by current taken from storage batteries to the largest yacht which takes its current directly from the mains of the ship's station. There are available for this sort of service many varieties of machines. Numerous of these are adapted to supply current through the medium of a large storage battery installation, while others are designed to supply current directly in proportion to the load by means of automatic devices to govern the speed of the machine.

For the smaller craft it is probable that the battery type machine which operates its lamps at 32 volts is the most satisfactory. The operation of this is a simple matter, and it is only required to run the plant for a few hours per day in order to keep the battery in a fully charged condition. The service requirements use the current from the battery at all times, but it is possible on occasion to secure the combined capacity of both the battery and generator for short periods where an excessive amount of current may be wanted. In installations of this type it is not essential that the plant be operated every day nor during the period when the current is being drawn. It is quite feasible to recharge the battery during the morning or other daytime period when the slight sound of the generator's operation will not be a disturbing factor.

By far the most satisfactory equipment of this kind is the machine which generates current at 110 volts. This has the very important advantage that standard central station fixtures which are easily obtainable throughout the world can be attached and operated without requiring any alterations. Lamps, fans, heating units, small motors and

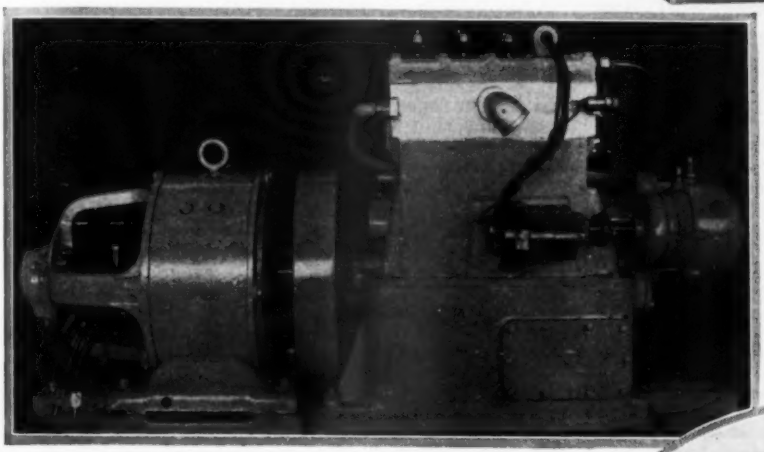


The C-Y-C 32 volt generating unit as installed in the engine room of a boat. It occupies but little space and is rated at 1,500 watts

machinery, vacuum cleaners, and other accessories too numerous to mention can all be successfully used. Another very attractive feature about the 110-volt machine is the absence of batteries. It is true that this requires the generator to operate at all times when light or current is desired. The modern machine makes little of this effort and can generate current in small quantities as well as up to the maximum of its size capacity with proportionate fuel expenditures.

The pressure loss in transmitting current at low voltages is appreciable. In a large boat where there might be some hundred odd feet of wire for the current to pass through between the battery and lamp, the loss is sufficient to reduce the efficiency of the lamp to an undesirable degree. The loss on a line at 110 volts is negligible so that the furthest lamp from the machine

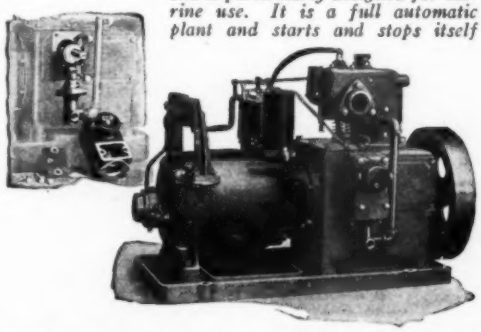
A 4 k.w. generating set built by the Allison Engineering Co. in their Indianapolis plant. This is a light weight machine with a four-cylinder gasoline motor and fully governed electrically



The smaller of two sizes of generating sets built by the Winton Engine Works, Cleveland, Ohio. The engines in four- and six-cylinder units of the same dimensions drive generators of 5 and 7½ k.w. capacity respectively

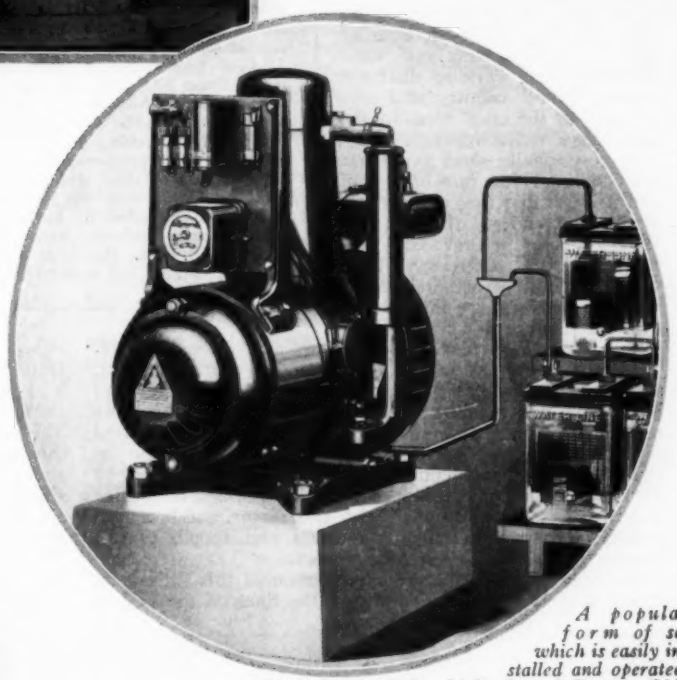
will burn with equal brilliancy to the one right above it. In addition to the advantage of ample power for lighting, it is quite possible to comfortably heat a cabin or two by means of the portable type electric heaters which are now so popular. While it is true that all heating devices use large amounts of current, the fact that this can be generated on board the boat for lesser cost than central station service in the household, is a feature in its favor. Another valuable aid on board the yacht is a powerful search light. With

This Matthews unit generates 1 k.w. and is particularly designed for marine use. It is a full automatic plant and starts and stops itself



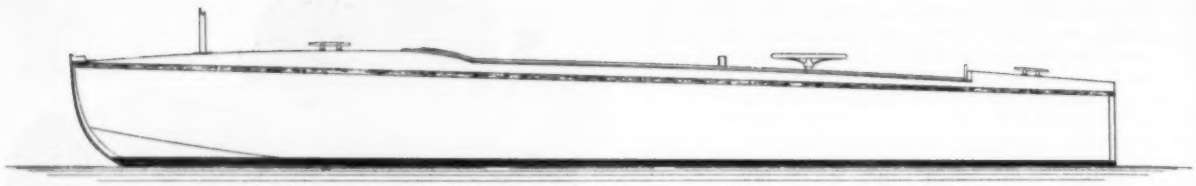
unlimited current to draw upon, a light may be carried which will penetrate ordinary darkness without effort.

An electric generating unit can be had today which will fulfill all the requirements for current on boats of both large and small dimensions. Its operation is so simple that the mere act of turning on a single lamp anywhere in the circuit will instantly energize a separate armature on the generator and start the plant operating. Current will be produced in exact ratio to the requirements, and the machine will run at its lowest permissible rate. As more lamps are lighted or other appliances brought into service, the automatic control permits the machine to speed up to the necessary extent to enable it to carry the added load without effort. When current is being drawn to the limit of the machine's capacity, it is operating



A popular form of set which is easily installed and operated. Made by the Delco Light Co., of Dayton, Ohio

at its maximum speed and will continue to operate until the demand is reduced. Using gasoline for fuel, the operating costs of these little machines are so slight as to be unnoticed. One of the most modern machines is arranged to operate practically without any external supervision. It will start from a stand-still, operate the choke on the carbureter by itself, and open it as the machine picks up the load by means of a solenoid controlled governor. After the machine is in operation, it automatically regulates the carbureter to the current requirements. This insures that the entire fuel being consumed is converted into useful current at all times with no losses in energy.



The outboard profile of Miss Mississippi, a 17-foot hydroplane

Miss Mississippi, a Fast Little Hydroplane

There Is No Longer an Excuse For the Speedster to Be Without a Fast Boat—Complete Plans and Specifications For Building Your Own

Designed exclusively for MoToR BoatinG

By John L. Hacker

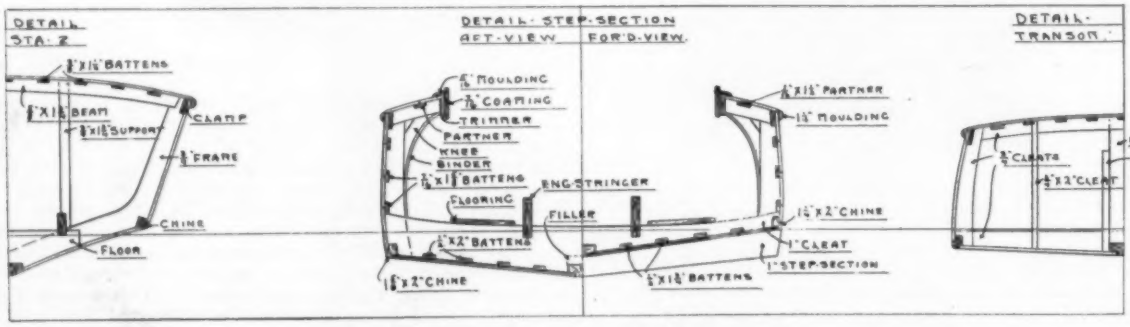
ANOTHER design for a fast little hydroplane is published in this issue and is something which the speedster has been waiting for. This design is for a smaller boat than the one published last month, but like it, is based on a fast little boat of 16 feet in length, the performance of which has been well tried and established. It has been lengthened by one foot so that this boat is to be 17 feet long. Its beam is 4 feet 10¼ inches at the widest point of the hull, while the maximum water line beam is 4 feet 7¾ inches. The increase in length tends to make the boat slightly more seaworthy and does not interfere with the speed possibilities in the slightest degree. If anything, the increase in length will tend to increase the speed, particularly in rougher water. Hydroplanes of similar types to this one have done excellent work in different sections of the country and particularly in the class races in the Mississippi valley regattas.

John L. Hacker, the famous designer of high speed runabouts and hydroplanes has designed for you this month this fast little 17-foot hydroplane. This little boat will travel from 32 to 33 miles per hour with the small motor which has been specified. For any who desire the excitement and real sport incident to travelling at high speed in a small boat we can recommend this design highly. The original of this design was a 16-footer and the addition of the extra foot in length will serve to make the hull much more seaworthy and probably a trifle faster. The motor will make the boat eligible for competition in any 151 cubic inch class.

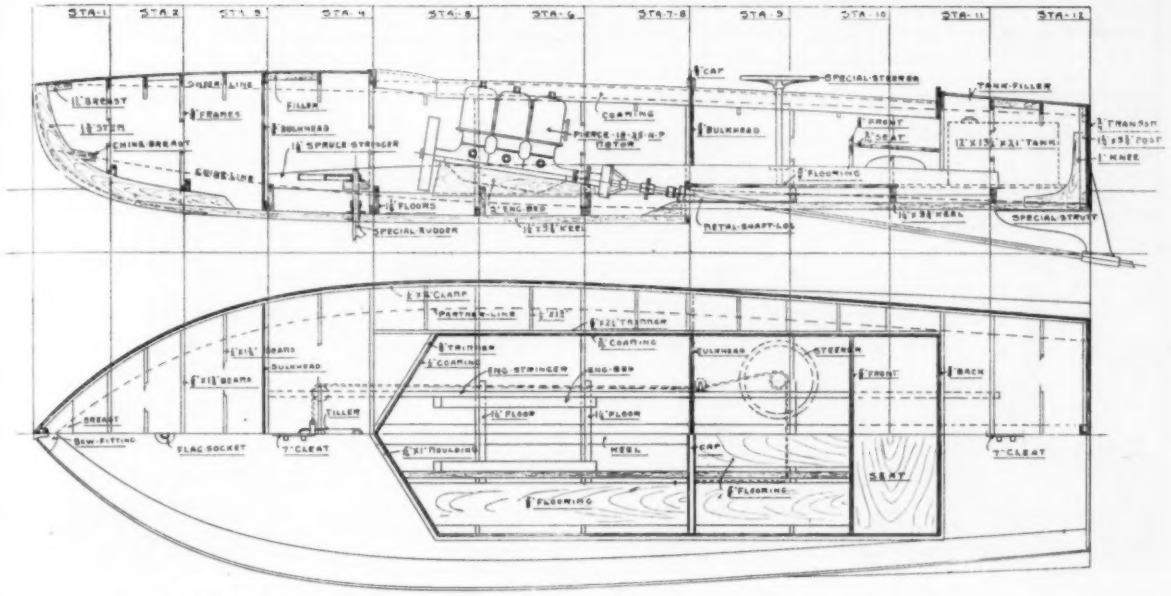
A most popular small motor has been selected for this little hull and it is peculiar that a two-cycle motor has rendered the best and fastest service in the boats. By reason of its extremely light weight and the great horse-power which it delivers, the little three-cylinder Pierce-Budd has been found to be particularly adapted for this class of work. This little motor has proven almost 100 per cent. consistent, and really is the only power plant suited for such a small boat which will produce the maximum speed. Similar boats to this have done as high as 33 to 34 miles under actual tests. Due to the simplicity of the construction and its small size it is confidently expected that this boat can be finished complete and equipped with the specified motor for less than $750.00. Equipped with this motor, the boat will qualify for any 151 cubic inch class and should give a wonderful account of itself in competition.

In order to undertake the construction of this little boat, it will first be necessary to lay off the lines of the hull in full size on paper. This is done in order to get the proper keel, chine, and height lines. A drawing is also made to locate the sheer and chine on the half breadth. All stations are dimensioned, but should be checked up with the floor lines in order to insure success. Much time will be saved in the end by care at this time. Heavy manilla paper is the best material to use for laying out these lines, and after this has been done, the section at each station should be similarly prepared on the paper. From these full sized sections the chine pattern is determined and the sizes of the planking can be taken off also. The station frames can next be prepared and this is done by placing the material of suitable dimensions underneath the paper patterns previously made and pricking through the lines of the pattern on to the wood underneath. It is only necessary to make a half pattern as the right and left members of the frames are sawn out at the same time. This insures their being identical in shape. The inner side of the frame is also scribed on and cut at this time. The sections at each station are then made up so that the dimensions on both sides of the center line are correct and symmetrical. The floors are then fastened in place, and a batten of about ¾-inch by 3-inch material is fastened across the frames at about the sheer height to hold them securely. The center line should then be located carefully on each frame, this will be found essential when they are set up. The offsets in the table are given in the regular form, in this case in feet, inches, eighths, and halves, which are sixteenths of an inch. An offset reading, 0-6-4 would mean simply 6½ inches, while one reading 2-7-5½ would mean 2 feet, 7 inches, 5 eighths and ½ an eighth or one-sixteenth, in other words, 2 feet 7 11/16 inches. All these dimensions are determined from the base line, both vertically and horizontally.

Experience has shown that the best way to build these



Construction sections forward, amidship and aft



Inboard construction profile, half beam plan and half arrangement plan for Miss Mississippi

boats is with the keel down. The keel is set up on 2- by 2-inch posts and securely stayed in place. It must be properly aligned by cutting the posts off at the proper heights. A cleat is fastened on one side which is screw fastened to the keel and holds it securely to the posts. The stem and the stern are then carefully plumbed, after which the frames can be successively erected, each in their proper place. Before fastening the keel to the posts, secure the step section in its proper place. Set the posts an inch or two forward or aft of the frames so that the fastenings will not interfere. The next operation will be the installation of the engine stringers and the side battens, after which fair up the frame and plank the sides. After this has been completed, turn the boat entirely over and plank the bottom.

In a small high speed craft of this nature, the lines have been very accurately prepared by the naval architect in designing the boat. Variations from these will affect the performance of the boat in unexpected ways and builders of the boat should consult with Mr. Hacker on any departure from the drawings as published. Mr. Hacker will be glad to render any assistance within his power to the readers of MoToR BoatinG who are building some of these boats.

Blue prints of the drawings for this boat, to a scale of one and one-half inches to the foot, can be had at moderate cost by addressing F. W. Horenburger, 63 West 184th Street, New York, N. Y.

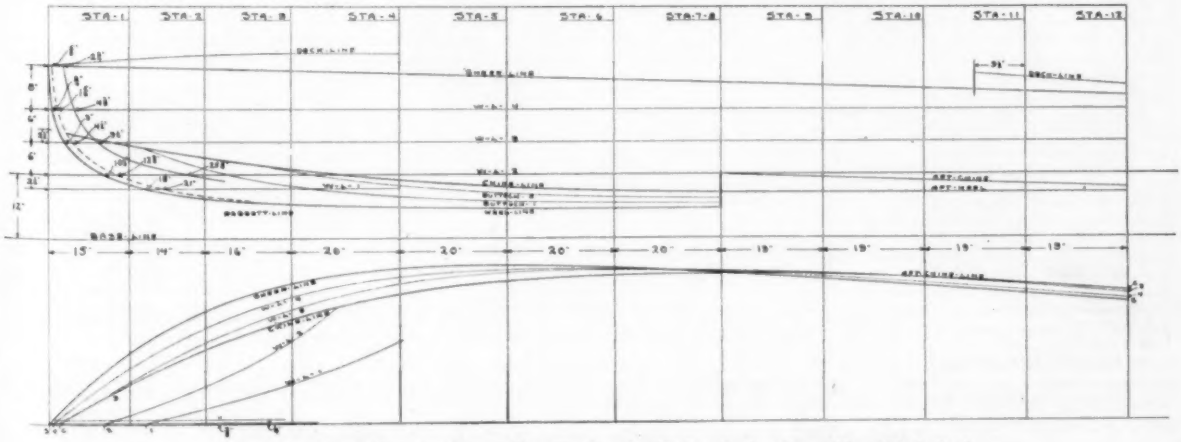
Several builders and manufacturers of accessories are preparing to carry in stock suitable fittings and material for the several boats which Mr. Hacker has designed thus far. The Editor will be pleased to furnish prospective builders with this information. Standardized fittings for these boats will be much more satisfactory than individually constructed parts and besides the item of cost will be a factor. Complete structural specifications describing all materials for buiiding this little hydroplane follow:

General Specifications

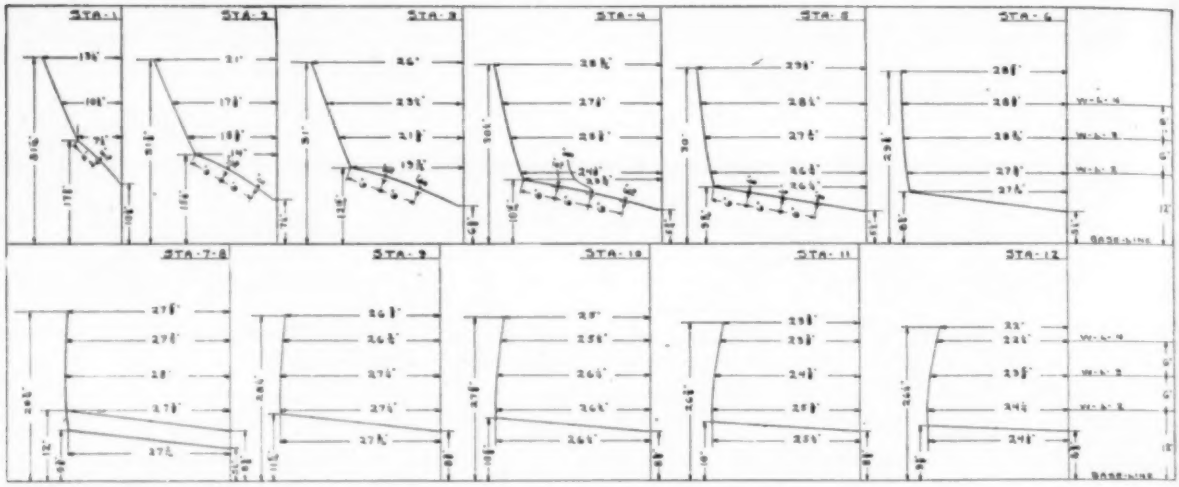
Keels: The forward keel is to be of 1½- by 3¾-inch white oak or yellow pine. It is to be properly beveled and rabbeted to suit the planking. The after keel is to be a piece of 1¼- by 4¾-inch yellow pine. This will be also properly beveled and rabbeted. Insert a filler of oak and through bolt. A pine tongue is to be inserted between the filler so as to prevent leakage.

Stem: This is to be preferably from a 1¾-inch hackmatack knee. If hackmatack is not procurable, a piece of white oak may be used with a knee of the same material to back it. This is to be properly shaped, beveled and rabbeted to suit the planking, and bolted to the keel with four fastenings and the rabbet continued.

Stern: The transom is to be of ¾-inch mahogany. It is to have cleats on the sides, bottom, and top of ¾-inch oak. The top cleat is to be dropped sufficiently to allow



A drawing of the lines in plan and profile for the 17-foot hydroplane Miss Mississippi



Drawing of the frame molds at each of the twelve stations for Miss Mississippi

for the decking. All to be securely screw fastened. The stern is to be fastened to a 1¼ by 3¼-inch post and mounted on the keel supported by a 1-inch hackmatack knee on each side. Screw fastenings to be used between post and keel, the holes to be wood plugged.

Step Section: The bottom member is to be shaped from 1-inch oak. It is to have side members of ⅞-inch material which are to be halved into bottom member on the inside. Securely screw and rivet fasten a cleat on the forward side of a section to take the forward battens. Then attach another on the after side to form station No. 8. This after cleat is to be applied on light canvas duck and laid in marine glue. Cut out an opening the size of the after keel, slide over same and screw fasten to keel, also through bolt to rabbet on each side with ¼-inch bolts.

Frames: To be of hackmatack and extend from keel to chine. To be of ¾-inch stock properly shaped and to be joined with an oak floor of sizes as indicated. They are to extend approximately 3 inches outside of stringer and to have at least six No. 8 copper rivets on each side. If preferred ¼-inch galvanized bolts may be used. Those frames which cannot be made of one piece are to have a bottom and a side member. The bottom is to be of ¾-inch and the side ⅝-inch material. Through bolt the side member to the bottom member with four 3/16-inch bolts or copper rivets. Then fasten to the floor in the same manner. The bottom member from station 8 aft may be in a single piece shaped from 1-inch stock and cutting down to ¾ inches outside of the stringer. The frames when completed are to be through bolted with 5/16-inch bolts to station 3 and with two bolts through to the rabbet to the stern.

Chines: The forward chine is to be shaped from 1⅝ by 2-inch white oak or yellow pine. It is to be properly beveled and rabbeted to suit the planking and slightly tapered to the stem. It is to be left into the frames and securely bolt or screw fastened to same. It is to be reinforced at the stem with the breasthook and at the step with a knee at each side. The after chine is to be shaped from 1¼ by 2-inch material and is to extend through to station No. 6. It is to be shaped and fastened in a similar manner to the forward chine.

Engine Stringers and Bed: Engine stringers are to be shaped from 1½-inch aero spruce. They are to be let in over floors and to be through bolted to them with 5/16-inch galvanized bolts. They are to be reinforced with a knee on each side at stations 5, 6, and 7 and with a filler bound with 5/16-inch galvanized iron for sway.

Engine bed is to be of 2-inch white ash and to be shaped approximately as per plan and to be aligned to suit the motor which will be installed. It is to be through bolted to the stringer and drift bolted to the floors. Stringers are spaced for the Pierce-Budd motor specified. If any other motor is selected the stringers should be so spaced that the motor will fit between them.

Clamp and Battens: The clamp to be of 1½ by 2-inch yellow pine. It is to be let into the frames and securely screw fastened to the same. It is to have a breasthook at the stem and a knee on each side at the stern.

Seam battens are to be of 7/16-inch by 1⅝-inch fir on the sides. ½-inch by 2-inch yellow pine or oak on the forward plane and ½ by 1¾ inches on the after-plane. These are to be let into the frames and securely screw fastened to same. They are to have two fastenings into each frame on the bottom batten. The two outside battens are to be fastened to the chine.

Deck Beams and Framing: The beams on the main frames are to be of ⅝-inch by 1¾-inch white wood with ½ by 1¼-inch beams in between. These are to be screw fastened and supported with a knee on each side on the main frames except at station 3. They are to be sawn to a proper radius. The trimmer is to be of ¾ by 2½-inch material forward and ⅝ by 2½ inches on the sides. It is to be screw fastened to the beams. The entire frame is to be neatly trimmed and faired up in readiness for the planking.

Planking: The sides of the boat are to be planked with 5/16-inch mahogany or cedar. It is to be spiled so that the seams will meet center of battens. Planking is to be in as long length as practical and brass screw fastened to the frames and copper riveted over burrs to the battens. All fastenings on sides are to be flush. All necessary butts are to be made on oak blocks not less than 6 inches long with six fastenings on each side. The block is to fit in between the battens. Seams are to be fitted flush and the chine seam only is to be caulked.

Bottom planking is to be of 7/16-inch material of the same kind. It is to be fastened in a like manner except that fastenings shall be set in and holes wood plugged or filled with composition. The fastenings should be 1¼-inch No. 9 screws into frames, 1-inch No. 8 screws into keel, chine, and clamp. Elsewhere use 1¾-inch copper nails with No. 13 burrs. When the planking is completed reinforce it at the step and stern with angle brass to be inlaid into the bottom and securely screw fastened. The planking seams on the bottom should be about 3/32 inches and are to be lightly caulked with spun cotton as well as the side seams on chines.

Decking: The decking is to consist of a mahogany covering board and which shall be screw fastened flush to clamp, beams, and a 7/16 by 1½-inch partner. The balance is to be of white

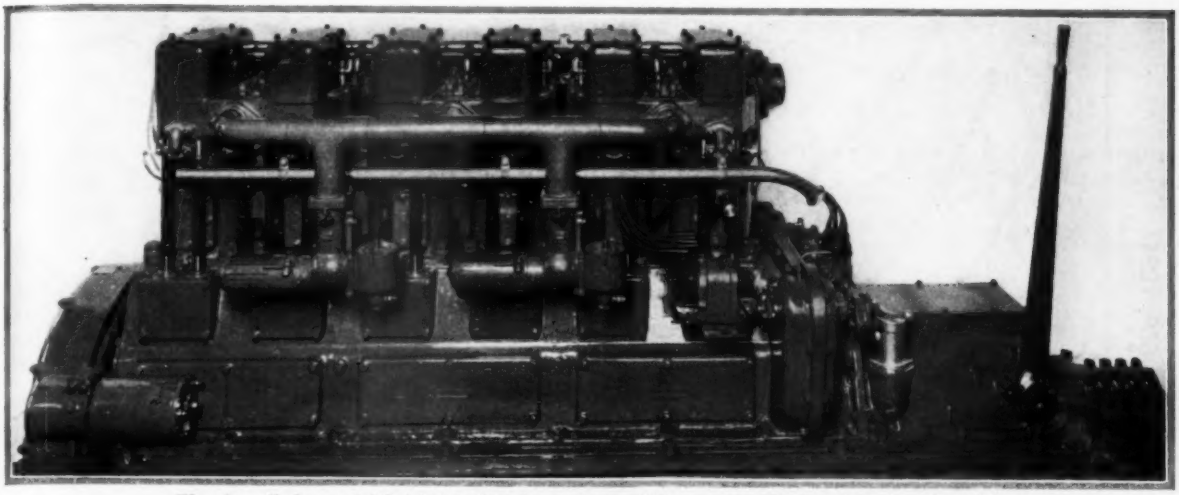
(*Continued on page* 110)

STATIONS	1	2	3	4	5	6	7	8	9	10	11	12
KEEL	0-10-1	0-7-4	0-6-3	0-5-6	0-5-4	0-5-4	0-5-4	0-8-3	STRAIGHT-LINE-TO			0-8-3
CHINE	1-5-3	1-3-1	1-0-7½	0-10-7½	0-9-4½	0-8-6	0-8-3	1-0-0	"	"	"	0-9-3
SHEER	2-7-5½	2-7-3	2-7-0	2-6-4	2-6-0	2-5-3	2-4-6	———	2-4-2	2-3-5	2-2-7	2-2-2
BUTTOCK - NO - 1		1-1-1	0-10-1	0-7-7½	0-6-7½	0-6-4	0-6-3½					
" " " 2			1-0-5	0-10-7½	0-8-4	0-7-5	0-7-3					
HALF-BREADTH'S												
CHINE	0-7-4	1-2-0	1-7-3½	1-11-6	2-2-2	2-3-1½	2-3-3½	———	2-3-1	2-2-3	2-1-2½	2-0-0
SHEER	1-1-2	1-8-7½	2-2-0	2-4-4½	2-5-1	2-4-6	2-3-6	———	2-2-3	2-1-0	1-11-3	1-10-0
WATER-LINE - NO - 1		0-3-0	0-7-4									
" " " 2	0-1-7	0-7-1	1-3-4									
DIMENSIONS GIVEN IN FEET INCHES EIGHTHS AND HALVES TO OUTSIDE OF PLANKING FROM BASE-LINE.												

Complete table of offsets giving the dimensions for both heighth and breadth

Latest Speedway Motors Going In Fine Yachts

New Marine Motor Introduced to the Public At the Recent Motor Boat Show Is Backed Up By A Liberal Guarantee



The six-cylinder model R 300 h.p. Speedway motor which was recently introduced to the public

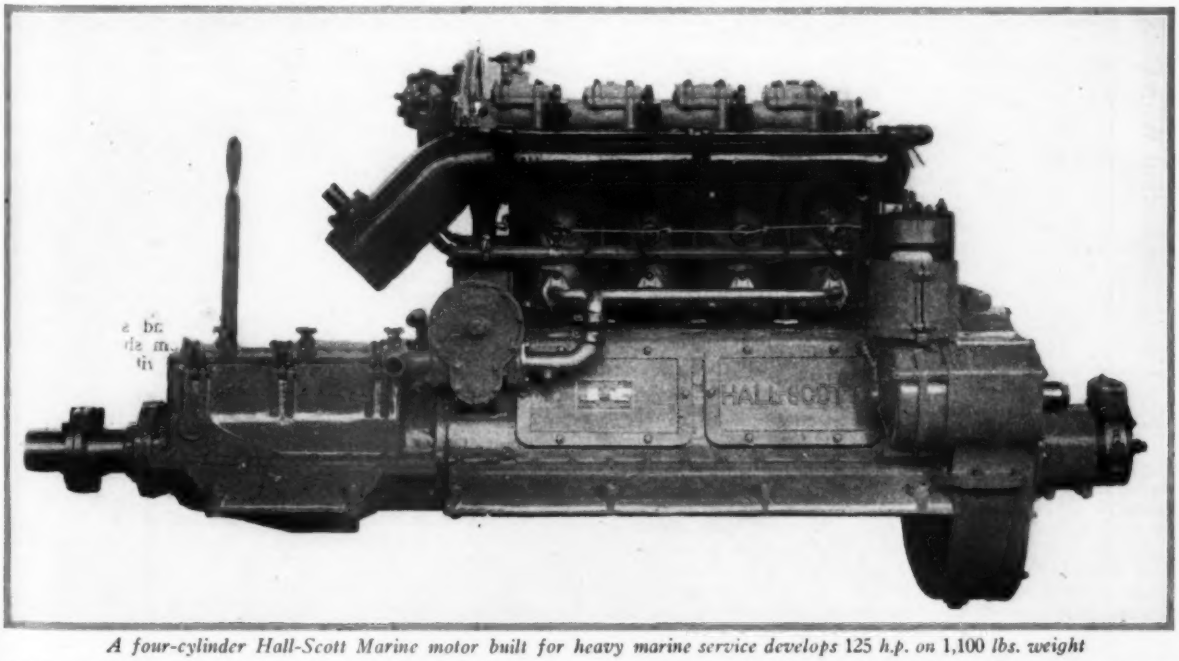
TWO of this year's new boats will be powered with twin Speedway Model R engines. The Model R six-cylinder 300 h.p. Speedway was designed and built by the Consolidated Shipbuilding Corporation last year, and was exhibited to the public for the first time at the recent New York Motor Boat Show. Many months were consumed in the exhaustive tests made on this motor before the builders were satisfied with its operation, and ready to stand behind it with their usual liberal guarantee.

The success of this motor is being closely watched by many marine engine men, as its size and type solves a powering problem that has always confronted yachtsmen.

Dr. H. N. Torrey of Detroit, Michigan, will receive the first pair of motors, and the second pair of engines will be installed in the new cruising boat of Julius Fleischmann of New York City.

Hall-Scott Marine Motors Are Built For Marine Service

High Speed Motor Boats Are Entirely Practical When Equipped With A Power Plant Designed and Built For the Work

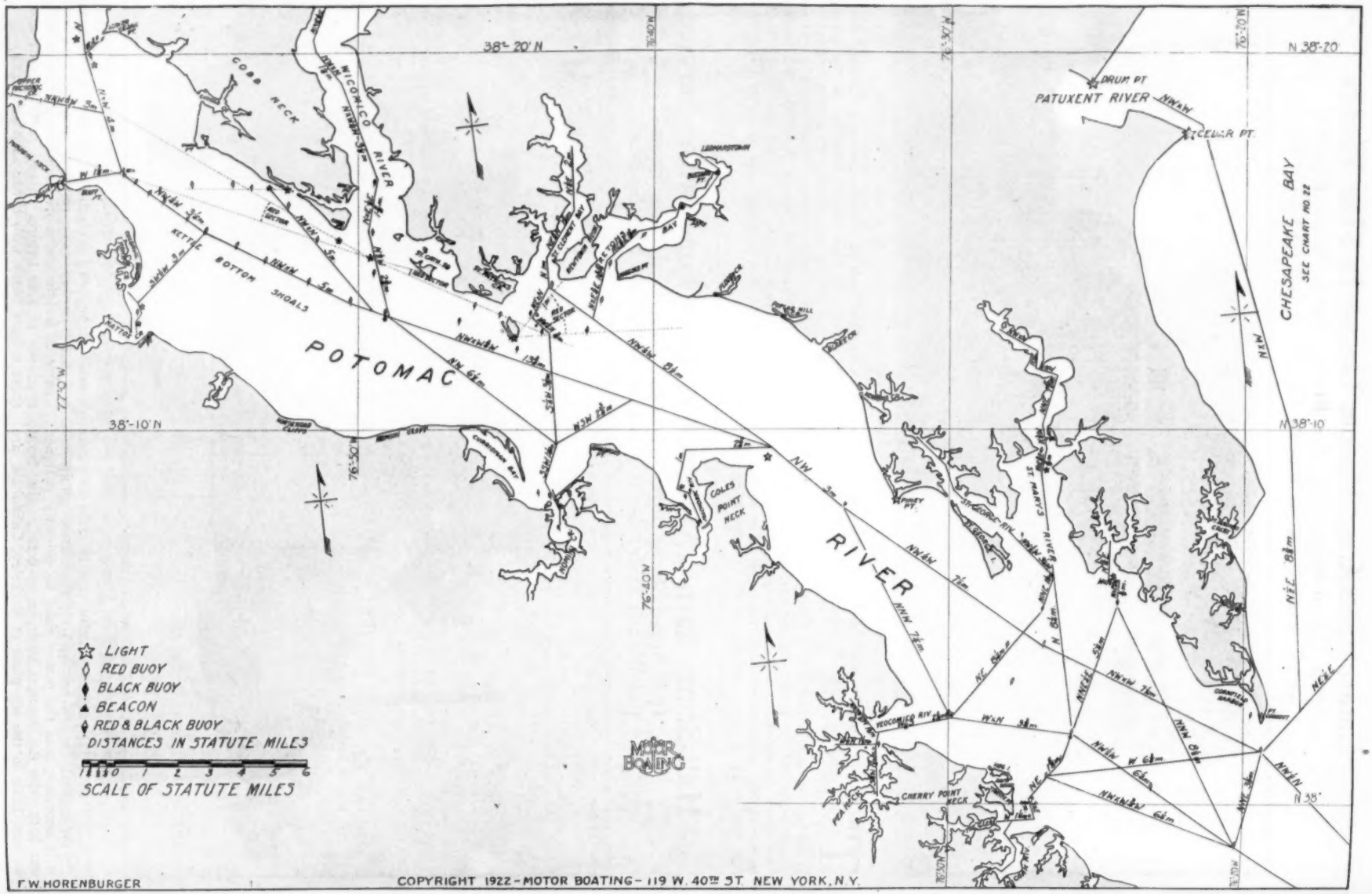


A four-cylinder Hall-Scott Marine motor built for heavy marine service develops 125 h.p. on 1,100 lbs. weight

EXPERIENCED yachtsmen know that in order to secure the highest class of service from their motor equipment it is necessary that the power plant be properly designed and built with the strictest attention to detail. Hall-Scott engines, built in the big plant at Berkeley, California, are notable examples of perfection. The most suitable materials and workmanship have resulted in a machine which is lighter in weight and more enduring in service than most machines of this nature. Many famous boats are using these motors today with entire satisfaction.

Motor Boatmen's Chart No. 31, Potomac River—Entrance to Lower Cedar Point

For Use in Connection With Coast and Geodetic Survey Charts Nos. 557, 558, 1224



Short Cuts in Figuring

Explaining the Uses of Logarithms, and the Solution of the Dead Reckoning Triangle by the Traverse Tables—The Third Lesson of a Correspondence Course Which Will Be a Complete Treatise on This Important Branch of Navigation

By Dean Potter

Chairman, Committee on Instruction, United States Power Squadrons, Inc.

LOGARITHMS (abbreviated logs) are used as a short cut in multiplying and dividing long numbers. The old school-day way was good enough in its place. But it required a tremendous lot of figuring, consumed quantities of paper, took a long time to work; and a slip anywhere in the process spoiled the answer. It is easy to make mistakes when wrestling with columns and columns of figures spread half way across the page. The navigator must solve his problems quickly and accurately. Generally he is not a mathematician. By using logs, he can multiply long numbers by merely adding their logs, or divide them by subtracting one log from another. Time and space are thus economized; and the likelihood of error diminished, after he has become thoroughly familiar with the use of the tables. Of course, he would gain nothing from logs, if the numbers to be dealt with were small. But grasp the idea that logs are not used to obtain occult results which cannot be had by arithmetic. They produce the same results as ordinary multiplication and division, and are nothing but labor savers.

Definition. A logarithm is the exponent of the power to which a number, known as the base, must be raised in order to equal a certain number. Or, it is the power to which we must raise a given base to produce a given number.

These definitions may seem rather cryptic. But a little explaining will clarify them. A number is said to be raised to a power when it is multiplied by itself. The second power of 10, written 10^2, is 100. The third power, or 10^3, is 1,000. That is, 10 x 10 x 10 (third power) is 1,000. The exponent of the power is the figure which shows to what power the number is to be raised. Thus in 10^2, 10^3, the small figures, are the exponents (or logarithms), and show that the second or third power is to be taken.

Now the base of a logarithm may be any number other than unity. But commonly 10 is used, and Bowditch Table 42, which is the table of logs. of numbers, is computed on a base of 10. Logs. with a base of 10 are called common logs.

Let us take 10 as a base. Then 10^2 or 10 x 10 is 100. It follows that the log. of 100 must be 2, because 2 is the exponent of the power to which the base, 10, must be raised in order to produce 100. So 3 is the log. of 1,000, because it is the exponent of the power to which the base must be raised to produce 1,000. 10^3 is 1,000. Now go back and read the definition, and see if you don't get it.

The addition of exponents. Now what does all this amount to? One further step and you will see. *The sum of the exponents always equals the exponent of the product.* For instance, suppose we want to multiply 1,000 by 100. Then

$$1{,}000 = 10^3 \text{ exponent being } 3$$
$$100 = 10^2 \text{ exponent being } 2$$
$$100{,}000 = 10^5 \text{ exponent being } 5$$

Work it out and see: 1,000 = 10 x 10 x 10. Multiply this by 100, which is the same as 10 x 10, and you have 10 x 10 x 10 x 10 x 10, or 10 to the 5th power. But these exponents 3 and 2 are the logs. of 1,000 and 100, and their sum 5 is the log. of 100,000. So here you have it that the sum of the logs. of 1,000 and 100 equals the log. of the product; for the product is 10^5, the exponent or log. being 5. Try it with any other combination, and you will get the same result. Thus:

$$10{,}000 = 10^4 \text{ log. } 4$$
$$1{,}000 = 10^3 \text{ log. } 3$$
$$10{,}000{,}000 \qquad 7$$

Let us make up a little log. table to experiment with. So that the figures may not get too big for handy use, let us take 2 as a base. Now 2 to the first power is 2; 2 to the second power (2 x 2) is 4; to the third power, it is 8, (2 x 2 x 2), and so on. Thus we have:

Natural number (antilog.)		Base and exponent		Logarithm
2	=	2^1	=	1
4	=	2^2	=	2
8	=	2^3	=	3
16	=	2^4	=	4
32	=	2^5	=	5
64	=	2^6	=	6
128	=	2^7	=	7
256	=	2^8	=	8
512	=	2^9	=	9
1,024	=	2^{10}	=	10
2,048	=	2^{11}	=	11

Suppose we want to multiply 4x8. We have above:

$$4 \text{ log. } 2$$
$$8 \text{ log. } 3$$
$$32 \text{ log. } 5$$

That is to say, according to our little table, the log. of 4 is 2, and that of 8 is 3, and the sum of these logs. is 5, and 5 is the log. of 32, which is the product of 4 and 8. Or, to multiply 32 x 64:

$$32 \text{ log. } 5$$
$$64 \text{ log. } 6$$
$$2{,}048 \text{ log. } 11$$

Instead of multiplying it out, all we have to do is to pick out the logs. of the two numbers to be multiplied, add them, and then run down the column of logs. and find the log. equaling their sum, and right opposite it will be the number or *antilogarithm* which represents the product sought.

Dividing. If adding the logs. gives the log. of the product; then we can divide by the reverse process. Thus to divide 2,048 by 64, we have, again using the above table:

$$2{,}048 \text{ log. } 11$$
$$64 \text{ log. } 6$$
$$32 \text{ log. } 5$$

Taking the log. of the dividend (11), and subtracting from it the log. of the divisor (6), gives the log. of the quotient (5), which represents the natural number 32. Try any other combination, and then check it up in the old way, and you will find that it always works. So let us be content with the assurance that it does, and not try to go into mathematical explanations of the reason.

Common logs. As stated above, the common log. table is computed on a base of 10, and this is the one found in Bowditch, (Table 42). We have seen above:

$$10 = 10^1 \text{ log.} = 1$$
$$100 = 10^2 \text{ log.} = 2$$
$$1{,}000 = 10^3 \text{ log.} = 3$$
$$10{,}000 = 10^4 \text{ log.} = 4, \text{ and so on.}$$

Now if the log. of 100 is 2, and that of 1,000 is 3, it stands to reason that the log. of any number between 100 and 1,000 would be somewhere between 2 and 3. It would be more than 2, but less than 3. In other words, it would be 2 plus a decimal. Unless we are using a number like 10, 100, 1,000, etc., the log. is always a mixed number, composed of two parts, the first being a whole number, called the *characteristic* or *index*, and the second part being a decimal, called the *mantissa*.

Open your Bowditch to Table 42. You will not find this discussion very helpful unless you follow it with the tables before you. At page 755 you will find the logs. of all numbers from 1 to 100, with both the indices and mantissae set

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F.W. HORENBURGER

down. The figure to the left of the decimal point is the index; the figures to the right are the mantissae. Except for these first 100 numbers, the indices are not given in the table, but only the mantissae. This is because it is easy to compute the index by a simple rule, soon to be explained; and we only need a table to give the mantissae. Beginning at page 756 are the mantissae of the logs. of all numbers from 100 up to 10,000. The first column headed "No." is the column in which you will find the first three figures of any number of which you wish to find the log. For instance, if you want the log. of 1,946, turn to page 757, and run down the first column headed "No." till you come to 194, these being the first three figures of your number. Then opposite 194, on the same line, will be found the mantissa. But there are 10 columns of mantissae. At the head of each column is a figure, as 0, 1, 2, 3, 4, etc. That figure represents the fourth digit of your number. Thus, 6 being the fourth figure of 1,946, you will find the mantissa of the log. in the colmun headed 6, and right opposite the figures 194 in the first column. The mantissa of 1,946 is .28914.

But we have seen that each log. consists of two parts, the index and the mantissa; and in order to get the complete log. the index must be prefixed. Now the log. of 1,000 is 3, and that of 10,000 is 4. 1,946. is between 1,000 and 10,000. So its log. must be 3 plus the decimal part, or mantissa; and the complete log is 3.28914.

The rule for finding the index of a whole or mixed number is that it is always one less than the number of digits in the number to the left of the decimal point. Thus, the index of 127 would be 2, there being three figures in that number. For 67,392 the index is 4, or one less than the number of digits it contains. In the mixed number 6739.2, the index is 3, in 673.92 the index is 2, in 67.392 it is 1, because it is one less than the number of digits in the whole number, disregarding the decimal part; or, as stated above, one less than the number of digits to the left of the decimal point.

We are aware that the last and present lessons have constituted pretty stiff doses. In them, the endeavor has been made to describe the tools we are to use in solving our dead reckoning problems. We have endeavored to swallow the subject in two huge gulps, because we wish to have done with it; hoping, however, that no one will be taken with acute indigestion. There is nothing especially thrilling about a trigonometrical function or a mathematical table. No doubt the sermons have been tedious. But if the audience has remained awake long enough to read these closing words, let us say that we are quite finished with explanations of tables for some time to come, and in the next lesson shall take up the sailings. And as we proceed to sea, we trust the subject may not be so dry. At any rate, the next lesson will not be so long, though covering more territory.— EDITOR.

The following may help to make clear the rule about finding the index:

10,000	index	4
1,000	index	3
100	index	2
10	index	1
1	index	0
0.1	index	—1
0.01	index	—2
0.001	index	—3
0.0001	index	—4

Throughout, the index of whole numbers is one less than the number of figures to the left of the decimal point. In getting the logs. of mixed numbers, we find the index for the whole number part, and disregard the decimal portion. But since the index of 10 is 1, and of 1 is 0, it follows that the index of 0.1 must be less than 0; that is, it must be a negative or minus quantity. And the indices of numbers wholly decimal are always negative, and are represented by a number 1 greater than the number of ciphers immediately following the decimal point. E. g., in 0.1 (there being no ciphers) the index is —1; for 0.01, it is —2, which is one more than the number of ciphers, and so on. In writing logs., however, the minus sign is not put before the index, but over it, thus: $\bar{2}$. This is because the index only is negative, the mantissa being always positive.

"The index is positive if the number be larger than unity, and negative if it be smaller; the mantissa is always positive."

Turn to Bowditch, and find the logs. of the following numbers:

No.	Log.	Page
27	1.43136	755
201	2.30320	757
3,750	3.57403	760
4,899	3.69011	762
489.9	2.69011	762
7.643	0.88326	767
0.7643	$\bar{1}$.88326	767
0.0764	$\bar{2}$.88309	767

It will be seen that while the position of the decimal point affects the index, it does not affect the mantissa, which is picked out exactly as if there were no decimal point in the number. The moving of the decimal point one place divides or multiplies the number by 10. But the mantissa of the log. of any number answers equally for any multiple or submultiple of that number by 10. The mantissa is not affected by moving the decimal point.

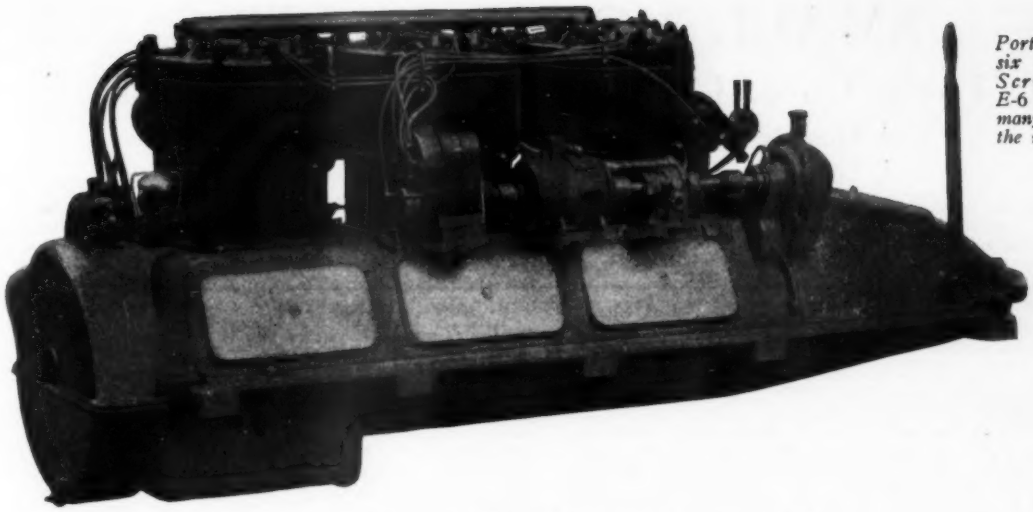
Finding the antilogarithm. In multiplying or dividing by logs., we obtain an answer which is a log., and must then find the natural number which it stands for. Suppose we had multiplied two numbers by adding their logs., and had obtained the log. answer 2.45362. Now this log. answer is not the product, but the log. representing the product. We must have the natural number. The index being 2, the antilog. must be a number having 3 places or digits to the left of the decimal point. It will be in the hundreds. Somewhere in the table will be found our mantissa, or the one most nearly agreeing with it; and when it is found we can very easily get the antilog. by simply reversing what is done in taking out a log. We turn the pages of Table 42 rapidly until we approach .45362 in the first mantissa column. Having come near to it in the first column (unless we strike exact agreement) we run out into one of the other columns till we find the mantissa agreeing most nearly with ours. Thus, on p. 759, 5th line from top of column headed 2, we find mantissa .45362, which is exactly what we are looking for. But this mantissa represents 2842, the first three digits appearing in the first column, and the fourth digit at the top of the column in which we found the mantissa. Now point off 3 places from the left; for, since the index is one less than the number of digits in the whole number, conversely, the digits in the number must be one more than the index. Thus 284.2, is the natural number, antilog., or answer sought.

Multiply 267.9 x 12.38. Solution:

267.9	log.	2.42797	page 758
12.38	log.	1.09272	page 756
		3.52069	

Here the index being 3, the antilog. must have 4 places, or be in the thousands. Hunting for the mantissa as before, the nearest to be found is on page 759, where we get in the 6 column .52061, and in the 7 column .52075. Our mantissa does not exactly agree with any in the table, but is somewhere betwen these two. Here take the nearest one, .52075, the antilog. of which is 3,317., pointing off 4 places, or one more than the index. This answer is not absolutely accurate, because our mantissa did not exactly agree with that in the table. But the error is only a fractional part of 1. A closer answer could be had by interpolating to find out what this fractional difference amounts to, a method to be explained later. But in dead reckoning, it is generally sufficient to take the nearest mantissa; for the slight error so caused makes no difference. In dead reckoning it is unnecessary to figure closer than tenths of a mile. And it is an unusual distance indeed that runs above 3 figures. Gen-

(*Continued on page* 66)



Port side of the six cylinder Scripps model E-6 which made many friends at the recent show

A Smooth Running Six

An Ideal Power Plant Where Six-Cylinder Smoothness and Quietness Are Required for Runabouts and Cruisers

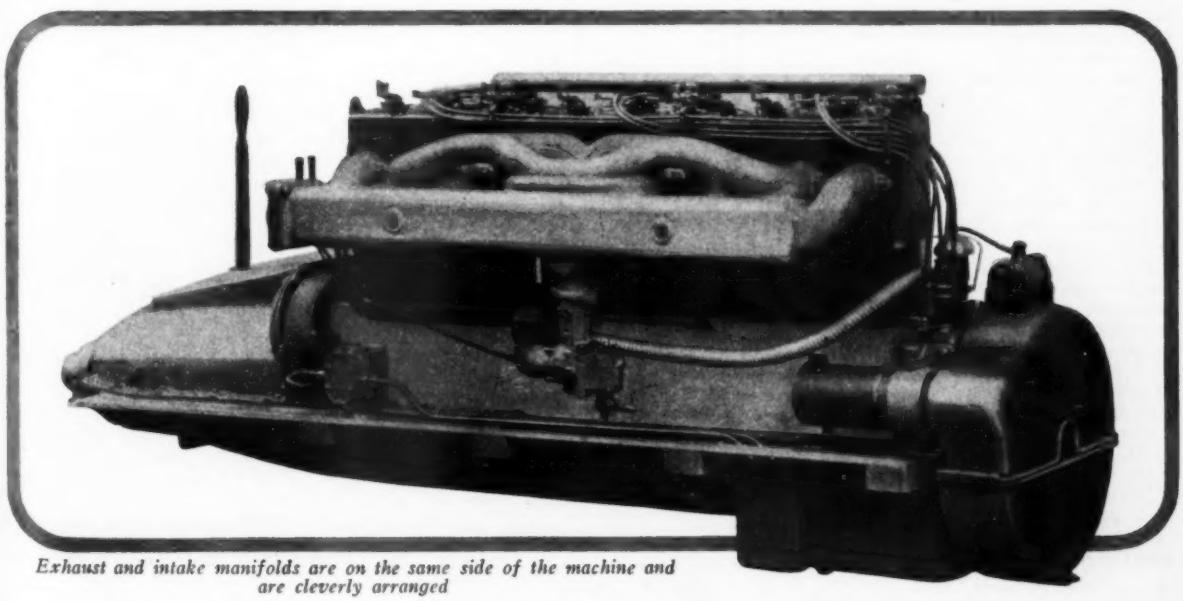
THE insistent and growing demand for six-cylinder smoothness and operating quietness in the modern marine motor is being met by the Scripps Motor Company, of Detroit, with their new model E-6 marine motor. This machine was shown for the first time at the recent Motor Boat Show in New York and created a very favorable impression and made many new friends.

While there are many six-cylinder motors in larger size units in the field, the new Scripps stands almost alone in its size. It has a bore of 4½ inches and a stroke of 6 inches and is built in two different types. One of these is a medium duty machine of from 40 to 60 h.p. designed particularly for slower speed service, such as is required on cruisers and heavier vessels. The other is a high speed model of from 60 to 100 h.p. adapted to fast runabouts. The experience gained in specialized manufacturing of marine sixes for years past has been applied to these machines. They are not a hurriedly designed job to meet the sudden demand, but an up to the minute refinement. All of the good features in the earlier Scripps motors, such as dependability, freedom from vibration, cleanliness, and quietness of operation, have been retained.

The low grade fuel common today presents many difficulties to the engineers in proper manifolding and carbureting. These problems have been solved in a splendid manner on these machines, particularly in the six-cylinder units. The new six has a hot spot manifold that actually conquers low test gasoline. The advantages of this are apparent in the continuous torque of the overlapping power strokes and the absence of loading up the cylinders, lean periods, and the perfect firing in each cylinder.

Every drop of the fuel is utilized by reason of this perfect vaporization. Economy tests have shown a fuel consumption as low as 0.6 lbs. per horsepower-hour. This is approximately at the rate of ½ pint per horsepower-hour. A greater power output is consequently attained for the piston displacement on a minimum fuel consumption.

Further refinements have been added in the point of ignition. Magneto ignition is the standard fitting, although two spark plugs are supplied in each cylinder so that every individual preference in ignition may be supplied. The reverse gear is a Paragon and needs no comment. Lubrication is by means of a high pressure system which forces oil through the drilled crankshaft.



Exhaust and intake manifolds are on the same side of the machine and are cleverly arranged

SMALL MOTOR BOATS

Their Care, Construction, and Equipment

A Monthly Prize Contest Conducted by Motor Boatmen

Questions Submitted for the July Prize Contest

1. Describe the installation of an emergency tiller on a small cruiser, ease and quickness of attachment with a minimum of loose parts being considered.

Suggested by H. H. P., Oakland, Calif.

2. Show by means of sketches or plans a tender using an outboard motor that will have good carrying capacity without taking up too much deck space.

Suggested by R. W. H., Mansfield, Ohio

Rules for the Prize Contest

ANSWERS to the above questions for the July issue, addressed to the editor of MoToR BoatinG, 119 West 40th St., New York, must be (a) in our hands on or before May 25, (b) about 500 words long, (c) written on one side of the paper only, (d) accompanied by the senders' names and addresses.

The name will be withheld and initials used.

QUESTIONS for the next contest must reach us on or before May 25. The Editor reserves the right to make such changes and suggestions in the accepted answers as he may deem necessary.

The prizes are: For each of the best answers to the questions above, any article or articles sold by an advertiser advertising in the current issue of MoToR BoatinG of which the advertised price does not exceed $25, or a credit of $25 on any article which sells for more than that amount. There are two prizes—one for each question—but a contestant need send in an answer to only one if he does not care to answer both.

For answers we print that do not win a prize we pay space rates.

For each of the questions selected for use in the following month's contest, any article or articles sold by an advertiser advertising in this issue of MoToR BoatinG of which the advertised price does not exceed $5, or a credit of $5 on any article which sells for more than that amount.

All details connected with the ordering of the prizes selected by the winners must be handled by us. The winners should be particular to specify from which advertisers they desire to have their prizes ordered.

How Often Should the Crankcase Oil Be Changed?

Rapid Deterioration of Engine Lubricants Necessitates Frequent Changing —The Interval Depending on Type of Engine and Quality of Oil Used

Answer to the Following Question Published in the March Issue

"How often should the oil in a marine engine crankcase be changed? describe a method for reclaiming the old oil and state to what use it is put"

Drain Old Oil Frequently

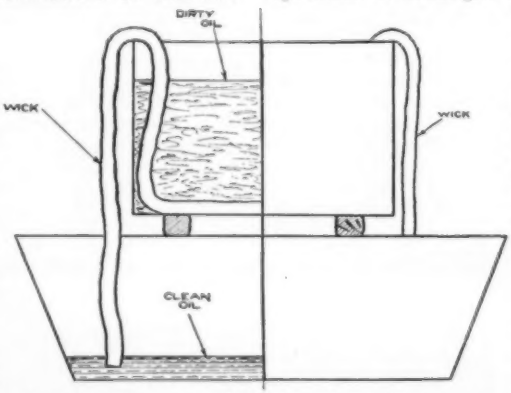
(The Prize-Winning Answer)

CRANKCASE oil becomes contaminated by dilution with unburned fuel, by accumulations of sediment consisting of dust, particles of worn metal and carbon and by water. When the water is circulated with the oil and dirt, an emulsion is formed which thickens the oil and may cause a paste which will clog screens, pumps and oil passages. These conditions are illustrated by the oil analyses given below with explanations.

The rapidity of contamination depends, among other factors, upon the character of the fuel (gasoline or kerosene), the ability of the carbureter and inlet manifold to vaporize the fuel, the correctness of the mixture, the jacket water temperature, the type of lubricating system, whether the carbureter draws part of its air from the crankcase, and on the character of the lubricating oil.

While general rules can be given for draining, it is difficult to give definite recommendations without knowledge of the specific conditions as the following example shows: In an engine run at full load with the water outlet at 90°F., the oil was dangerously thin in ten hours, while with the water at 130°, dilution was negligible after the same length of time.

Where gasoline is used as fuel and, assuming that the mixture is correct, the intake air heated and the jackets as hot as possible without causing knocking, if the engine has a lubricating system in which the oil is circulated by a pump and used over and over again, draining once every 50 hrs. of actual operation should be sufficient. This would ordinarily be equivalent to about 500 sailing miles. If kerosene is used, drain every 25 hours, possibly oftener.



A simple filter system devised by R. W. H. uses capillary attraction to move oil along the wick

Where the lubricating system is such that fresh oil is fed continuously to all bearings and pistons as by a mechanical oiler, draining once every 100 hours is sufficient to prevent undue piston wear from the old oil in the base. Where kerosene is used with this type of system, it is best to keep the oil level below the point where the rods will dip. In such engines, conditions are more or less special and the manufacturers' advice should be followed.

There are devices made to indicate the condition of the crankcase oil. While these may show the extent of dilution with some accuracy, they do not indicate the dangerous condition of thickening by formation of emulsions with water as illustrated by the third analysis. They may, therefore, be misleading.

A word of caution: Do not wash out the crankcase with kerosene. Some of it may remain to dilute the fresh oil you put in. Draining the oil when it is hot will carry off practically all the sediment and a quart of fresh oil will flush out the rest.

Where high grade oils are used with gasoline fuel, they may be economically reclaimed by the following method: The used oil is put in a vented tank and steam

Examples of Oil Contamination

	No. 1	No. 2	No. 3
Specific Gravity	.925	.895	.931
Flash	360°F	145°F	185°F
Fire	400°F	...	...
Pour Test	5°F	Below 0°	Below 0°
Viscosity			
at 104°F	260 seconds	66 seconds	386 seconds
at 140°F	106 "	.. "	199 "
at 210°F	48 "	37 "	...
Percent Fuel	..	21.9	9.6
" Dirt, etc.	..	.05	.67
" Water	..	Trace	34.0

No. 1. Analysis of New Oil.
No. 2. Same oil used 10 hours. Note per cent of fuel and resulting reduction in flash test and viscosity.
No. 3. Same oil used 15 hours. Note that oil is thickened by formation of emulsion with water in spite of dilution. Sample caused bearing failure.

under a pressure of about 30 pounds blown through the oil for about an hour or until a test shows that it has regained its original flash test. This drives off the fuel. A quantity of Gold Dust washing powder is then added and the oil steamed for about 15 minutes. The mixture is then allowed to stand several hours, during which the washing compound mixes with the dirt, carbon, etc., and settles out, leaving the clear oil to be drawn off. This may then be used for any purpose to which the new oil was suited.

While some filtering processes will remove dirt and much of the free carbon, only a steaming or distilling process will remove the fuel which dilutes the oil. Unless the crankcase drainings amount to several barrels a year, reclaiming does not pay. If kerosene fuel is used, reclaiming is very expensive and is not usually worth while. The old oil may be used for oiling roads, or spreading on marshes to kill mosquitos. It is not fit to use as a lubricant.

G. A. R., New York, N. Y.

Select Your Oils With Care

IT is rather difficult to say just when to change the oil in the crankcase as some oils go bad in a remarkably short time, especially when unsuited to the engine, while other oils apparently retain their lubricating properties until the last drop is used up. Generally speaking, the most reliable opinion of the lubricating properties or the absence of the same of an oil can be formed from the viscosity of the sample under consideration.

The term, viscosity, is used to indicate the relative fluidity or body of the oil and as the body is that characteristic which tends to maintain a film under pressure and keep the metal surfaces apart, it can easily be seen that an oil with a high viscosity or good body would be much more desirable than one with a low viscosity or poor body, also that an oil which has lost its viscosity due to heat, contamination, dilution, and usage would be undesirable.

The viscosity of an oil is determined by the time required for a certain quantity to flow through a standard orifice at a certain temperature and is expressed as so many seconds at the given temperature. Viscosity decreases rapidly with increasing temperatures, the difference per degree varying for oils from different bases, and for use in internal combustion engines, should be known at 100, 212, 300, and 500 degrees, Fahrenheit. A high speed heavy duty engine will require an oil which has a high viscosity at the higher temperatures while a lighter duty engine can use an oil of much lower viscosity or lighter body. The instrument generally used in the laboratory for the determination of viscosity is the Saybolt Universal Viscosimeter.

While very few will care to go to the trouble of carefully testing their oil at frequent intervals, any motorboatman can keep a fresh sample of his oil near the motor and, by draining another small sample from the crankcase, compare their relative fluidity, and after a bit, become able to judge quite accurately when the oil begins to lose its lubricating properties. Never allow even a light bodied oil to become so poor that, when cold, it will flow like water, and when in doubt—change.

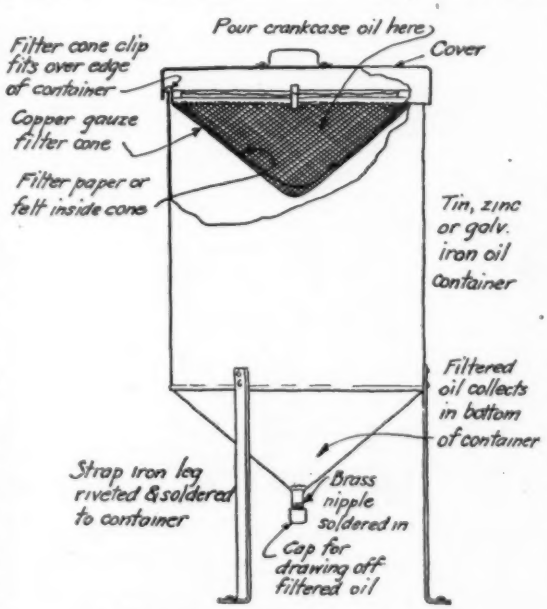
In connection with the subject of oils, it is well to keep in mind the fact that different types of engines will require different kinds of oil and choose your oil carefully after making a thorough analysis of your particular engine requirements. Don't get into the fatal habit, for the engine, of asking for "Two gallons o' good oil, medium." Once last summer I purchased some medium heavy oil that was both well known and widely advertised, at 80c per gallon, and filled the crankcase of an eight-cylinder, high compression, high speed engine with it. After less than 350 miles of running, this oil was drained and found to be just like water. In justice to this oil, however, I must say that it gives very satisfactory service in lighter duty engines. This oil was then replaced by an oil consisting of castor blended with an equal amount of high grade mineral oil, using oleic acid as a binder and costing $1.50 per gallon. A 2,200 mile run was then made without adding to the original supply and, when drained off, was found to be decreased by about 15%. It looked almost good enough to use again, but safety prevailed and the engine was refilled with more of the same brand.

A large portion of the oil which has become unsuited for further use in the engine can be reclaimed and used to lubricate parts not subject to either extreme heat or heavy pressures, many of which can be easily found on the average power boat. The simplest arrangement accomplishing this is as shown in the accompanying sketch. A pail is supported above a larger pan or bucket by means of two sticks or rods and strips of wicking arranged so as to syphon and, at the same time, filter the oil from the upper into the lower receptacle. The clear oil which collects in the lower receptacle can be put away in cans and used as needed.

R. W. H., Mansfield, O.

Renewing Crankcase Oil

THE oil in a marine engine crankcase should really be changed continually. Though a common practice, it is poor engineering to use engine oil over and over. This is particularly the case with a gasoline engine using the sort of fuel furnished nowadays, for a certain percentage of this always works down into the crankcase and dilutes the lubricating oil, sooner or later making it unfit for further use. In fact many mechanical engineers state that an entirely new type of gasoline engine must be developed in order to overcome this difficulty. If the oil could be continually pumped through an efficient filter and all the carbon and bearing residue removed, a great improvement would be made, but such an arrangement is hardly practicable in a small engine, and the ordinary strainer only serves to remove comparatively large particles. Even then, with the oil perfectly filtered, there is a great question as to how long such oil would retain its lubrication qualities.


Pour crankcase oil here
Cover
Filter cone clip fits over edge of container
Copper gauze filter cone
Filter paper or felt inside cone
Tin, zinc or galv. iron oil container
Filtered oil collects in bottom of container
Strap iron leg riveted & soldered to container
Brass nipple soldered in
Cap for drawing off filtered oil

H. H. P. proposes the use of an old felt hat as the filter material

To throw out a crankcase full of used oil and refill with new is an expensive undertaking if performed often, so we must arrive at the conclusion that the best thing for the boat owner to do is to renew his crankcase oil as often as he feels financially able to do so, and at least as often as called for in the instructions furnished by his engine manufacturers. A home-made filter may be constructed out of a large can or a bucket and an old felt hat; the hat is secured at the top of the can and the old oil poured in. It then filters slowly through the felt and collects in the bottom of the can where it is poured or drawn off at intervals. A little more elaborate filter may be made in a similar manner, but with a copper screen cone in the upper end of the retainer, held by clips or otherwise; this cone holds the felt filter, but a cone of common wrapping paper, free from pin holes, or even one of newspaper, works as well as the felt.

(*Continued on page* 116)

Intensifying the Current at Spark Plugs

Consensus of Opinion Indicates That Auxiliary Ignition Devices Are Unnecessary—If the Motor is in Good Condition They Do Not Improve It

Answer to the Following Question Published in March Issue

"What has been your experience with auxiliary ignition devices for intensifying the secondary current at the spark plugs? Describe and illustrate the outfit used, comparing relative qualities of devices integral with the spark plugs, attached to the plugs, or designed as a separate unit".

To Intensify Secondary Currents

(The Prize-Winning Answer)

PRACTICALLY all auxiliary ignition devices intended to intensify the secondary current at the spark plugs make use of the outside spark gap or gaps in series with the plug gaps and do not give any actual increase in the power or intensity of the spark. Nor will they reduce your repair bills, cut your gasoline consumption in half, or increase your speed fifty per cent, as some enthusiastic manufacturers are prone to claim. But they unquestionably will fire a spark plug that is so badly fouled that the ignition system alone will fail to fire it. The reason the extra gap can enable the current to fire a fouled plug without increasing its intensity is as follows:

When a plug becomes fouled, the carbon and oil provide a path for the current which offers less resistance to its passage than the regular path through the gap. Since electricity always takes the path of least resistance, the current leaks through the oil and carbon in the form of a brush discharge and so weakens the potential (pressure) at the gap that the spark is unable to jump, just like a big leak in the water main in the basement, may make it impossible to draw any on the third floor. Sometimes, however, this path through the fouling has just sufficient resistance to prevent all of the current passing through the leak in the short time given it and the remainder is forced to take the more difficult path across the gap. This remainder is so weak though that a weak stringy spark is the result and the engine either fires intermittently or not at all.

To use the water analogy again; this leak somewhat resembles a pail with a hole in the bottom. If the pail is filled slowly, as at a tap, the water will leak out as fast as it runs in. If the pail, however, is filled all at once, as by dipping, a portion of the water may be transported before the pail becomes empty. Likewise with the fouled spark plug; if the potential of the current is built up comparatively slowly, as it usually is, the greater portion of it leaks through the carbon and oil. Now, if there was some method of holding back the current until the potential had reached its maximum and then allow it to flow to the plugs in an irresistible surge, nearly all of the current would be forced to jump the gap before any appreciable amount could leak through the fouling. This is exactly what the extra gap does—furnishes a resistance to the flow of the current that is greater than the resistance of the spark plug gap, and when the current becomes strong enough to jump the auxiliary gap, it is more than strong enough to jump the spark plug gap. Notice the accompanying graphs showing the effect on potential and elapsed time of the spark.

However, as I said before, there are many things that an auxiliary gap will not do. For instance, it will not rectify the troubles resulting from shorted or oil-soaked cables, dirty distributors, pitted breaker points, punctured condensers, weak batteries, or the thousand and one ills that can befall the average ignition system. If the regular ignition system is in good working order, the insertion of an auxiliary gap will give a snappier spark and fire fouled plugs, nothing more, unless the gap should be placed between the coil and the distributor instead of between the distributor and the plug, in which case it will assist the current through a dirty distributor head. The disadvantages of these gaps are: the constant snapping and buzzing, and, if the gap is of the exposed type and gasoline present, the danger of explosion.

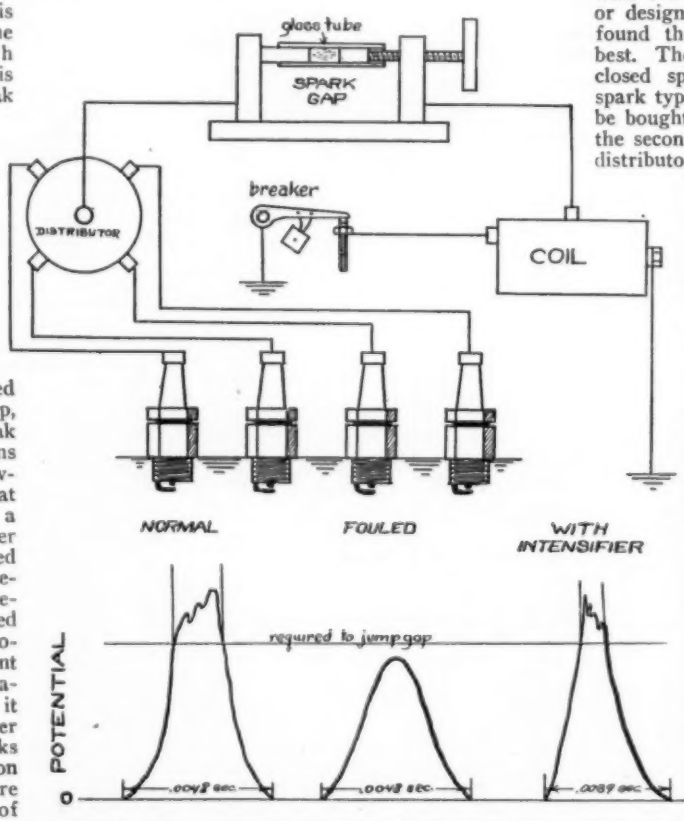
In regard to the relative advantages of devices integral with the plugs, attached to the plugs, or designed as a separate unit, I have found the last mentioned course the best. The use of an adjustable and enclosed spark gap, as used on many spark type wireless sets and which can be bought for a dollar or so, placed in the secondary line from the coil to the distributor gives the best results as the one gap serves for all plugs, can be adjusted or closed at will, is more or less safe from an explosion standpoint, and in addition to overcoming fouled plugs, overcomes dirty distributors.

Having the device integral with the plugs is next best as it is enclosed and therefore more or less silent and devoid of the fire risk, to say nothing of being foolproof. The exposed type, attached to the plugs, is undoubtedly the least desirable as they are noisy, dangerous, inclined to loosen and fall off, and in addition, retail for many times what they cost to manufacture.

In general, the installation of these devices is an unnecessary procedure, especially so if the engine has a good ignition system, but for the chronic oil pumping, plug fouling engine they serve a decided purpose, although the best thing to do would be to remedy the trouble by an overhauling.

R. W. H., Mansfield, O.

(*Continued on page* 55)



Wiring diagram for an adjustable spark gap intensifier designed by R. W. H. and the effect of the intensifier on the strength and duration of the spark

Questions and Answers on Lesson No. 2

Lights for All Classes of Boats

MoToR BoatinG's Correspondence Course in Piloting, Seamanship and Small Boat Handling

1. Q: Through or around how many points may the following lights on vessels show? (a) White light. (b) Red light. (c) Green light.
   A: (*a*) 12, 20, 32. (*b*) 10, 32. (*c*) 10.
2. Q: Should the red and green side lights be visible across the bow? Are they?
   A: *No; yes.*
3. Q: If at sea you saw one white light (and no other light) what might it be?
   A: *Range or stern light of motor boat any class, inland steamer, ocean-going steamer, ocean-going yacht, sailing vessel or motor boat under sail and power.*
4. Q: If you saw two white lights vertically arranged (and no other light) what might it be?
   A: *Boat of over 150 feet in length at anchor.*
5. Q: If you should see two red lights vertically arranged (and no other lights) what might it be?
   A: *Vessel totally disabled; vessel under partial control being overtaken.*
6. Q: If you should see two red lights vertically arranged in addition to one or more white lights near by, what might it be?
   A: *Dredge; vessel made fast to or moored over a wreck.*
7. Q: If you saw two white lights horizontally arranged (and no other lights) what might it be?
   A: *Ferry boat being overtaken; ocean-going barges being towed.*
8. Q: If at sea you saw two white lights (vertical, horizontal or otherwise) and one red and one green light, what might it be?
   A: *Motor boat, inland steamer, ocean-going steamer, ocean-going yacht, ferry boat or motor boat under both sail and power approaching head on or nearly so.*
9. Q: If at sea you saw one red and one green light (without white lights) what might it be?
   A: *Sailing vessel or motor boat under sail and power approaching head on or nearly so.*
10. Q: If you should see a red over a white light with red and green side lights, what might it be?
    A: *Fishing vessel.*
11. Q: If you should see a white light over a red light but with no red or green side lights, what might it be?
    A: *Pilot vessel on her station at anchor.*
12. Q: What lights are carried by motor vessels?
    (a) Class 1. (b) Class 2. (c) Class 3.
    A: (*a*) *Class 1 combination bow light and 32-point stern showing through the required arc or separate lights optional and if used similar to Class 3.* (*b*) *Class 2 white bow light, port and starboard lights and stern light showing through the required arc.* (*c*) *Class 3 same as Class 2.*
13. Q: What are the sizes of the light lenses which are required on
    (a) Class 1 motor boats? (b) Class 2 motor boats? (c) Class 3 motor boats?
    A: (*a*) *Class 1 not specified.* (*b*) *Class 2 bow light 19 square inches. Side lights 16 square inches. Screens 18 inches long.* (*c*) *Class 3 bow lights 31 square inches. Side lights 25 square inches. Screens 24 inches long.*
14. Q: If you are overtaking an ocean-going vessel what light or lights, if any, do you see?
    A: *12-point taff-rail light or none at all.*
15. Q: What precautions must a vessel take which is not required to show a light visible from astern?
    A: *Must have a white or flare up light at hand to show if overtaken.*
16. Q: How do the lights on ocean and inland steamers differ?
    A: *After range light on ocean-going steamer shows 30 points. After range light on inland steamers show through 32 points.*
17. Q: How do the lights carried on harbor and ocean-going tow-boats differ?
    A: *Harbor tow boats show white lights through 32 points. Ocean-going tow boats show white lights 20 points ahead only.*
18. Q: When are the side lights carried on
    (a) Motor boats. (b) Pilot vessels. (c) Ferry boats. (d) Disabled boats. (e) Ocean steamers. (f) Fishing vessels. (g) Cable vessels.
    A: *When underway.*
19. Q: How should the aft range light (32 point) on a motor boat always be placed relative to the bow light?
    A: *Higher than bow light.*
20. Q: Should a tug boat when towing carry a 20-point bow light?
    A: *No.*
21. Q: What lights do the following vessels being towed carry?
    (a) Ocean barges towed tandem.
    (b) Barges and canal boats on Hudson River towed tandem.
    (c) Barges and canal boats towed in tiers.
    (d) Car floats.
    A: (*a*) *Side lights and the last barge in the string will show 2 white lights horizontally arranged; 12-point steering light is also carried.* (*b*) *Show a white light bow and stern and 2 horizontal white lights at stern of last barge.* (*c*) *A white light at the outboard bow of each outside boat in the tier.* (*d*) *Car floats show a white light at the outboard corner of the outboard barge. In case of a single barge, lights are carried on the side away from the tug.*
22. Q: When does a tug boat carry
    (a) One 32-point light? (b) Two 32-point lights? (c) Three 32-point lights?
    A: (*a*) *When traveling alone.* (*b*) *When towing a tow less than 600 feet in length from the stern of tugs.* (*c*) *When the length of tow exceeds 600 feet.*

Note: In questions 23-33, assume your boat to be a motor vessel.

23. Q: When a red side light on a vessel is visible showing toward your red light, what do you know about the other boat's course and what action do you take?
    A: *Perfect safety go ahead. Both boats hold course and speed.*
24. Q: When the red side light of a vessel underway is visible showing toward your green light, what do you know about the other boat's course and what action do you take?
    A: *Other boat has right of way; you should give way.*
25. Q: When the green side light of a vessel underway is visible showing toward your green light, what do you know about the other boat's course and what action do you take?
    A: *Perfect safety go ahead. Both boats should hold course and speed.*
26. Q: When the green side light of a vessel underway is visible showing toward your red light, what do you know about the other boat's course and what action do you take?
    A: *You have right of way; other boat must keep clear.*
27. Q: When both red and green side lights are visible, what is your action?
    A: *Boats approaching head on or nearly so. Your action should be guided by position of range lights. Give way to the right if possible.*
28. Q: When a side light is visible on your starboard bow and the upper (range) white light is to the right of the lower white light, what does it indicate to you and what is your action?
    A: *The other boat's course is approaching your course, danger of collision exists, other boat has right of way and should hold course and speed; you should keep clear.*

(Continued on page 114)

Southern California Becomes Center of Motor Boating

Interest In Racing and Other Boating Activities Shows Great Gains—An All the Year Round Sport on the Pacific —Southern California to be Racing Center

THE California Yacht and Motorboat Club closed its charter membership recently with two hundred and twenty-eight applications for membership. The complete list of charter members will be announced as soon as the membership committee has completed its work.

The Club fleet now numbers thirty-nine boats, ranging in length from one hundred and sixty to eighteen feet. The six largest craft measure over all, respectively one hundred and sixty, one hundred and thirty, ninety-eight, ninety, eighty-five, and eighty feet.

It numbers among its fleet six of the fastest motorboats on the coast, and, in addition to the thirty-nine boats already enrolled, about twenty more are being built for entry.

The California Yacht and Motorboat Club was incorporated February 10 last. Since its incorporation it has secured a lease on four and four-tenths acres on the East Basin at Los Angeles Harbor, fronting on the present Yacht Anchorage. It controls four hundred feet of water frontage. On this property it is erecting a clubhouse. The property has been fenced, and a contract has been let for a concrete landing barge, one hundred by twenty-one feet, to cost eight thousand dollars.

The California Yacht and Motorboat Club has entered into contract with the Los Angeles Athletic Club under which, in return for a slight concession to the Athletic Club, the California Yacht and Motorboat Club secures for its own members all of the advantages of the Athletic Club's Outer Harbor plant, when it is built, without any additional expense to the club's members. This contract itself is one of the biggest assets of the racing club.

The board of directors and officers of the California Yacht and Motorboat Club are: Bernal H. Dyas, president; Frank A. Garbutt, vice-president; A. P. Robinson, E. B. Giffen, T. M. Farrand, A. J. Waters, joint treasurers; S. C. Hall, secretary. Edwin Bergstrom is the architect and engineer, who has charge of the building and concrete construction of the clubhouse and barge. Among the prominent members of the club may be mentioned: E. L. Doheny, G. Allen Hancock, Keith Spalding, C. B. DeMille, E. A. Featherstone, Hal Roach, Dr. Albert M. Soiland, Harry Chandler, and William M. Garland.

When the membership list is complete, an election will be held to select a commodore and other flag officers.

The California Yacht and Motorboat Club officials state that its principal object is the development of the maritime spirit in California, and its ambition is to make Los Angeles one of the yachting and motorboat centers of the world, and it invites all Californians to aid in the realization of this aim.

With all of the above accomplishments, within a month, to its credit, it would seem that the club is destined to become a dynamic force in its chosen line of endeavor. It will work hand in hand with the Athletic Club, and with the Los Angeles Athletic Club Motorboat Association, and with the other yacht and motorboat clubs of California, to put yachting and motorboating on the map in the Southwest.

In addition to its campaign for Southern California, it is planning a comprehensive line of eastern publicity, in order to acquaint the eastern yachtsmen and motorboat enthusiasts with the possibilities in the Pacific, including Puget Sound, which is one of the most wonderful places in the world for all kinds of yachting, motorboating, hunting and fishing.

Yachting and motor boating activities on the west coast will take a decided leap into prominence when all the plans in project are put into execution and carried out.

Officials of the club confidently predict that twenty million dollars worth of yachts and motorboats will be on the coast within ten years.

Farnum Wins "Fellows' Day" Handicap

MISS LOS ANGELES II, with Dustin Farnum, the cinema actor and motorboat enthusiast, at the wheel, crossed the finish line first in the motorboat race over the sixty-six mile course at the Los Angeles Outer Harbor, in the March 26th handicap. Joe Fellows, in whose honor the event was staged by the Los Angeles Athletic Club Motorboat Racing Association, piloted his Fellows IV between the buoys, at the finish, just twenty-four seconds behind the winner.

Dusty Farnum negotiated the distance in the speedy time of 1:40:39.6, an average of thirty-nine and thirty-four hundredths miles per hour. Fellows covered the course in 1:41:3.6, an average of thirty-nine and eighteen hundredths miles per hour. The Mystery and the Hurricane II, the other entrants in the race, failed to complete the course.

Quite a flock of speedboat fans were present to witness the classic, despite the fact that a rough sea was forecasted. This prediction, like many others, went gaflooey. Frank A. Garbutt in the Mystery, engaged Farnum in a spectacular duel for two laps, but the Mercury Club poo-bah was forced out in the third lap.

Miss Los Angeles II and the Mystery were almost neck and neck, as the pseudo-sailors aboard the spectators' craft remarked, when they crossed the line after completing the first sixteen and a half mile lap. Foxy Mr. Garbutt outgeneralled his rival in turning the first stake, and gained about fifty yards.

Why Garbutt retired from the race was shrouded in much mystery, but it was whispered aboard the official boat, the M. J. W., that Beanie Walker, who was a passenger aboard the Garbutt craft, produced a pair of diamond-studded dice, and induced one of the crew to join him in the game of African golf, so the sailor deserted his post for the galloping dominoes. It was later learned, however, that the Mystery did a nose-dive in the third heat, and that one of the crew was severely injured about the face.

In the third lap Miss Los Angeles II unshipped her rudder, and was forced to suspend the wild dash temporarily while said rudder was reshipped.

Wild Bill Paden made a creditable showing in the first lap, but he had to give up the ghost when one of the cylinders on the Hurricane I cracked.

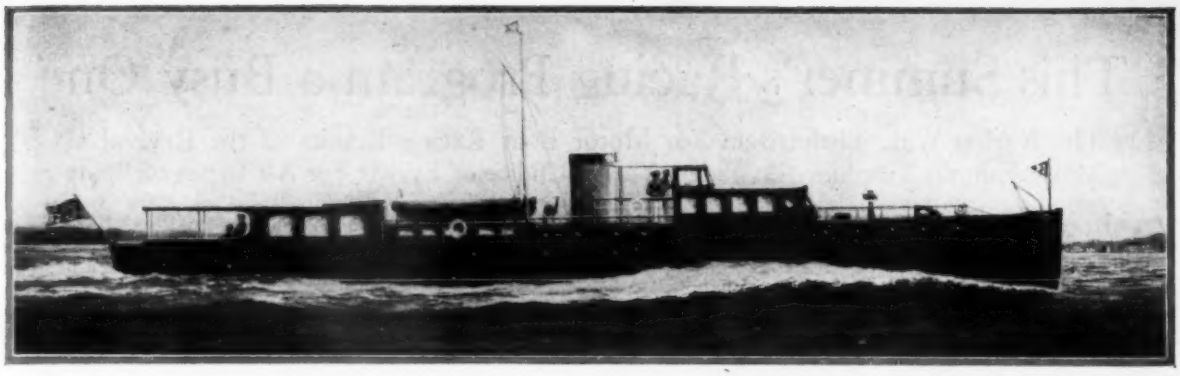
A small tug, laden with vampires, drew alongside the M. J. W. and its fair cargo gave the motorboat officials the alcohol salute. The sweet creatures cast over a bottle labeled Gordon gin, but upon testing the contents it was found to be naught but good old Owens River water!

Clubs Consolidate

FINAL arrangements for the consolidation of the Los Angeles Motorboat Club, and the Los Angeles Yacht Club, were completed recently at a meeting of the officers of the two organizations with the result that the two oldest nautical bodies in Southern California are now one. The name and burgee of the L. A. Y. C. was retained, but the clubhouse and anchorage of the motorboat club will be the home of the revamped organization.

With the addition of the Los Angeles Motorboat Club, the yacht club is the largest on the Pacific Coast, boasting a fleet of one hundred and forty craft, and over three hundred members.

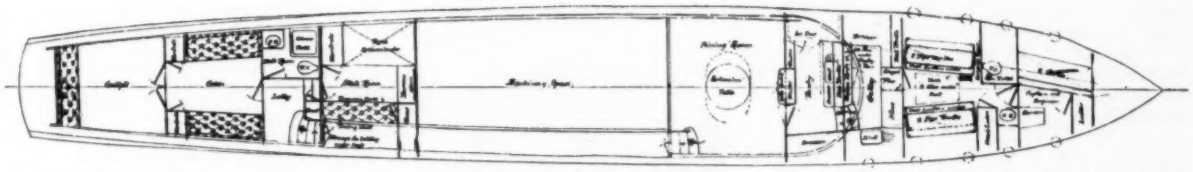
Otto G. Wildey, former commodore of the Los Angeles Motorboat Club, was elected commodore of the Los Angeles Yacht Club, while Eugene Overton, who was formerly flag officer of the Los Angeles Yacht Club, was intrusted with the duties of vice-commodore of the new fleet. Morgan Adams was made rear-commodore.



An Express Cruiser With Speed

Designed for Fast Ferry Service Between the Home and Office, This Boat Will Fulfill Every Expectation

A DESIGN for a fast express cruiser has been prepared by Henry J. Gielow which is intended to serve as a fast ferry between the owner's summer home and his business. It is not intended to make an excessively speedy craft of this, but to hold the speed down to about 20 or 22 m.p.h. Higher speeds cause more vibration and require heavier material in the hull. The arrangement plan can be modified to allow for an additional stateroom where the high speed requirement does not exist. Quarters for the owners are in the after portion of the vessel.

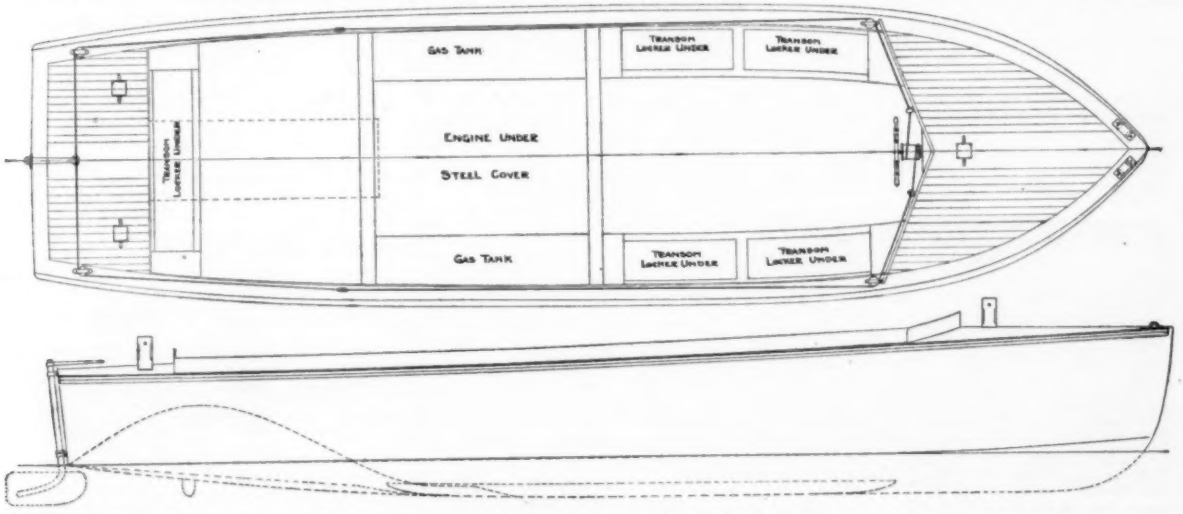


The outboard profile and arrangement plan of the speedy express cruiser designed by Henry J. Gielow for fast ferry service. Length will be 99 feet 6 inches, beam 13 feet 6 inches, and draft 4 feet 6 inches

Tunnel Stern Hull of Steel Plate

Unusually Strong Construction for Heavy Duty Work on Shallow Fast Flowing Rivers

THE continuous demand for more of the shallow draft heavily constructed pleasure or work boats which the American Balsa Company built at their Long Island City plant some time ago has prompted them to undertake the new series of steel boats along the same lines. A group of these 26 feet long is being rapidly completed, and the faults which developed in the earlier series have been remedied and many improvements in the construction incorporated. The hulls will be constructed of 18 gau. steel plate and fitted with water-tight transverse bulkheads. A tunnel in which the propeller operates permits of a large propeller being used on a limiting draft of only 10 inches. The power equipment will be a two-cylinder 5- by 6-inch Palmer motor which will drive the boat as fast as economy permits.



Outboard profile and arrangement plan of the 26-foot shallow draft open boat being built of steel by the American Balsa Co. at their Long Island City plant

This Summer's Racing Program a Busy One

The Nation Wide Enthusiasm For Motor Boat Racing Results in the Revival of Many Famous Trophies—A Widely Varied Choice of Events For All Types of Boats

THE year of 1922 should be the greatest racing season ever. More major events are scheduled for the coming few months than ever before in the history of the sport. The season will get under way officially with the Mississippi Valley Regatta at Peoria, Illinois, early in July and from then on almost continuous racing will occur until late in September. On the Pacific, principally at Los Angeles, motor boat racing has taken a great boom and the racing season out there lasts nearly fifty-two weeks in the year.

In Southern California, great enthusiasm is being shown over yachting and motor boating in all its branches. Big things have been started and there will be something doing from this moment on. The California Yacht Club, fostered by the Los Angeles Athletic Club, which was organized less than two months ago, today has over 325 members, a fleet of fifty-nine boats, and scores in the course of construction. This club is building a fifty thousand dollar club house and the Los Angeles Athletic Club itself has taken a long lease on a wonderful ten acre site in the outer harbor and will eventually expend possibly a half million dollars on its yachting department. It is only awaiting certain federal and municipal improvements to start on these projects.

A merger of the Los Angeles Yacht Club with the California Yacht Club is contemplated. The former club has a membership of 265, and a fleet of 137 boats. This merger, should it be effected, would make the largest organization on the Pacific Coast and would be of great importance to the advancement of yachting and motor boating on the Coast.

One of the most important happenings in the racing world for a number of years is the recent decision of the National Association of Engine and Boat Manufacturers to once again put their valuable trophies into competition. These trophies which are large, perpetual ones, were raced for annually from 1905 to 1914. Since then, on account of the war and for other reasons, no races have been held for these National Association cups. However, at a recent meeting of the Executive Committee of this organization, it was voted to offer the trophies again. Inasmuch as the National Association of Engine and Boat Manufacturers is not a racing organization, it was decided to turn over all of their trophies to the American Power Boat Association to be raced for as the latter organization saw fit.

The race for the International World's Championship Trophy will be held at Buffalo, August 10 to 12, under the auspices of the Buffalo Launch Club of which Humphrey Birge is Commodore. This class will be open to hydroplanes of over 20 feet in length and powered with motors of 2250 cubic inches piston displacement, or less.

The International World's Championship Trophy has probably more historical value than any other in existence at the present day. In the past, it has been won by such boats as the Dixie, Irene, Dixie II, Restless, Sand Burr II, Peter Pan V, and Harpoon.

The race for the National Championship Trophy will be held in 1922 on Lake George under the auspices of the Lake George Club. The race will consist of three heats, held on the Saturday afternoons of August 12, 19 and 26. This class will be for displacement runabouts of over 28 feet in length, powered with marine motors of 1100 cubic inches or less. The National Championship Trophy was won in 1905 by XPDNC; in 1906 and 1907 by Skedaddle, in 1910 by Tartar, in 1912 by Big Balaam, and in 1913 by Chinook.

The Interstate Championship Trophy will be open for competition between displacement boats of not less than 25 feet in length and powered with marine motors of 625 cubic

(*Continued on page* 116)

Races for American Power Boat Association Perpetual Trophies

Name of Trophy	*Club Conducting Race*	*Date*	*Place*	*Class of Boat*	*Chairman of Race Committee*
Gold Cup	Detroit Yacht Club	Aug. 26–Sept. 5	Detroit, Mich.	Displacement Runabouts over 25′ L.W.L. less than 625 cubic inches piston displacement	F. R. Still, American Blower Co., Detroit, Mich.
Wood-Fisher	Detroit Yacht Club	Aug. 26–Sept. 5	Detroit, Mich.	Displacement Runabouts over 32′ L.W.L. less than 2250 cubic inches piston displacement	F. R. Still, American Blower Co., Detroit, Mich.
Fisher-Allison	Hamilton Motor Boat Club Royal Hamilton Yacht Club	Aug. 17-19	Hamilton, Ont.	Displacement Runabouts over 32′ L.W.L. less than 3000 cubic inches piston displacement, marine engines	H. B. Greening, Hamilton, Ont.
Handicap Cruiser Championship	New York Athletic Club	Aug. 5	Long Island Sound, Huckleberry Island to Lloyds Harbor, approx. 50 miles	Cruisers between 30′ and 45′ L.W.L.	Walter Sullivan, 221 E. 58th St., New York, N. Y.
International World's Championship Trophy	Buffalo Launch Club	Aug. 10-12	Niagara River	Hydroplanes over 20′ L.W.L. less than 2250 cubic inches piston dis-displacement	A. J. Utz, 887 Niagara St., Buffalo, N. Y.
George Leary, Jr., Trophy	Buffalo Launch Club	Aug. 10-12	Niagara River	Hydroplanes over 20′ L.W.L., piston disp. 1,100 cubic inches and less	A. J. Utz, 887 Niagara St., Buffalo, N. Y.
National Championship Trophy	Lake George Club	Aug. 12, 19, 26	Lake George	Displacement Runabouts over 28′ L.W.L. less than 1100 cubic inches piston displacement, marine engines	R. E. Henry, 27 Pine St., New York, N. Y.
Interstate Championship Trophy	Interlake Yachting Association	July 19-21	Put-in-Bay	Displacement Runabouts over 25′ x 5′ 625 cubic inches piston displacement and marine engines	A. R. Hackett, 3934 Avery Avenue, Detroit, Mich.
Motor Yacht Championship Trophy	Detroit Yacht Club	Aug. 26–Sept. 5		Express and speed cruisers over 45′ L.W.L., marine engines	F. R. Still, American Blower Co., Detroit, Mich.
Handicap Express Cruiser Championship Trophy	New York Athletic Club	Aug. 5	Long Island Sound, Execution Light to Cornfield Lt. Ship, to Lloyd's Harbor	Express Cruisers 30′ to 60′ L.W.L., marine engines	Walter Sullivan, 221 E. 58th St., New York, N. Y.
James Craig Trophy (Handicap)	Columbia Yacht Club Atlantic City Yacht Club	June 24	New York to Atlantic City and return; Atlantic City to New York and return	Cruisers 30′-60′, marine engines	C. F. Chapman, 119 West 40th St., New York, N. Y.

Yard and Shop

Notes of Interest to Both Owner and Manufacturer

A Quick Valve Grinding Compound

A superior, rapid cutting, smooth finishing valve grinding compound in coarse and fine grades is made by the Abrasive Sales Corp. of New York. This material is prepared with true carborundum crystals, which is the most rapid abrasive material known to science today. A gas engine valve can be refinished in a few minutes with this material, since it polishes as it grinds. It never leaves rings or ridges on the valve seats. Where many valves are to be finished its use will save its cost over and again due to the reduction in the time necessary for the operation. Further economy can be effected in the reduced fuel consumption of an engine by the more perfect gas seal at the valve. Poorly fitting valves permit a large portion of the charge to leak out with consequent loss of compression. A perfect valve seat can be secured in five minutes' time by the use of this abrasive, thus keeping the motor in top notch condition at all times.

Yacht Agawam Sold

The large steel twin screw motor yacht Agawam has just been sold to R. W. Bartram of New York, by Richard T. Crane, Jr., of Chicago, through the agency of Cox & Stevens, the New York yacht brokers. This boat built in 1920 is 108 feet in length and is powered with two 125 h. p. Winton gasoline engines. After a summer spent in the local and eastern waters the yacht will probably undertake the cruise to Florida and the West Indies next winter.

Great Lakes Cruisers Are Popular

Some of the customers who have purchased Great Lakes cruisers think so well of them that they are tempted to sing their praises in letters to the company. A recent example from the captain of a 40-footer delivered not long ago is typical. It states: "I never heard a man praise a boat more than Mr. Robinson does the cruiser he has. He certainly is pleased with the boat and tells everyone about it." A visitor on board this boat was so impressed with its good qualities that he is planning to order a duplicate.

An electric controlled whistle valve which operates magnetically from a remote station. It can be attached at the whistle or at the tank and operated by means of electric current at six or more volts. Construction is entirely of brass

Pal-O-Mine, a cruiser in Florida, off on a fishing trip in Bayou Mack. This beautiful spot has the world beat for fresh and salt water fishing. The 20 h.p. motor with which Pal-O-Mine is equipped accomplishes the run from Pensacola, a distance of 75 miles, in quick time

The rapidly growing forces of E. J. Willis Co. have been augmented by the addition of E. B. Holden to the sales organization. He has had extensive experience in the marine field and will take care of many technical problems for the company's customers. No expense has been spared to give the trade the best service possible.

Engines and Accessories

A new company for the sale of rebuilt marine engines has been established in Philadelphia, under the name of the Marine Engine Co., of Philadelphia. The agency for Hall-Scott, Scripps, and Gray Motors has been secured and full lines of these motors will be carried and displayed. An extended business in the rebuilding and selling of used engines is being built up as well as a department to handle the sale of boats. A competent force of machinists is on hand to thoroughly rebuild used motors which pass through the establishment so that any motors sold will be certain to be in excellent condition. Both Matthews and Universal electric generating sets will be carried in stock with a full line of boat fittings and accessories.

High Speed by French Glider

Word has reached us that on an official trial trip a French hydroglider piloted by René Dupont attained an average speed of 128 km. per hour. This is equivalent to approximately 80 m.p.h., and it is further stated that the highest speed attained was at the rate of about 86 m.p.h. It is claimed that these speeds establish new records for this type of boat. The glider was equipped with a motor of 275 h.p. and weighed about 1,100 lbs.

Lubrication Instructions

Instruction booklets have been prepared by the Technical Department of the Vacuum Oil Company describing in great detail the approved methods of correctly lubricating specific types of marine engines. Engineers who are having difficulties with the proper lubrication of their product should consult with the experts of this great oil company as it is to the mutual benefit of all concerned that the correct methods of lubricating every different machine should be determined.

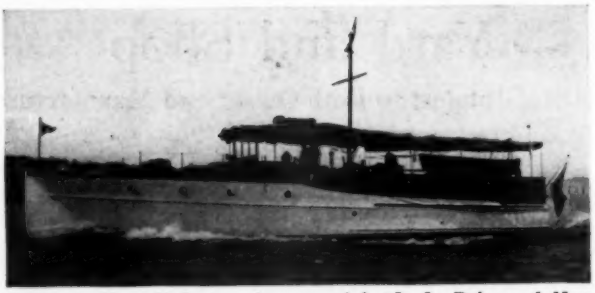
A New Galley Stove

Among the new accessories for boat use is an efficient gasoline stove that will operate under all conditions at sea. It is constructed of galvanized iron with brass tank and fittings and is adapted to salt water use. It burns ordinary gasoline, such as is used in the engine, and gives a hot steady blue flame that a gale will not blow out. A detachable key regulates the burners which insures a cold handle at all times. A brass rail around the top prevents utensils from sliding off. On large boats a three-gallon tank can be fitted and stowed far away from the stove. These stoves are made by the Prentiss-Wabers Stove Co., who have for many years been making Kamp Kook Kits for camping and touring use.

A little 26-foot standardized Richardson scout cruiser which has been shipped to Jacksonville for George Atkinson of Chicago has met his requirements in every conceivable way. The last heard from the boat it was starting on a long cruise to Miami

Repair It Now

Now is the time to put the marine engine which has seen several years of service back into first class condition. Instead of waiting until the last minute, the work should be undertaken before the last minute rush commences. In order to conserve the engine to the utmost extent, new pistons might be necessary. The lightweight Deluxe piston, made by the Clark Turner Piston Co. of Los Angeles, has many points of merit to commend it to those who need new pistons.



Gernemar II, a 50-foot cruiser owned by L. L. Driggs of New York and rebuilt not long ago by F. S. Nock. She is equipped with a six cylinder model GH Sterling marine motor which drives her along at a very comfortable speed

To End Fire

All motor boats are required to carry as part of their equipment an approved type of fire extinguisher capable of extinguishing burning gasoline. A new type of portable extinguisher which has many points of superiority over the earlier types of apparatus has appeared and some of its good features can be mentioned. It is capable of projecting a powerful continuous stream in any direction desired as compared to the intermittent stream of the pump type. Its operation consists in simply turning a handle which builds up a pressure within the cylinder. There are very few parts in its construction and an entire absence of small valves, tubes, springs, etc. There are no loose parts to rattle loose in vibration and its entire construction is of heavy brass. Its method of manufacture insures against corrosion due to the fluid. Part of the charge may be used and the remainder reserved.

The 28-foot Liggett cruiser, one of the series of stock boats being built by A. G. Liggett & Son of Wyandotte, Michigan. The popular Kermath Vanadium 20 will be used as power equipment in these boats

Business Depression Is Over

In every line of business things are picking up with a rush. Marine engine builders know this for they are getting their share. Buying in general has been on a hand-to-mouth basis and, with the rush of business coming on, this means that deliveries will be slow. Equipment manufacturers are affected in the same way that all other plants are, and are now asking delivery specifications three months in advance. There is going to be a shortage of marine motors this spring. Those who have delayed placing their orders will be disappointed in not being able to get their motors when their boats are ready. Unless orders for both motors and equipment are placed promptly, manufacturers will be unable to fill them before the year is out.

C. G. Amory Returns North

The treasurer of the Consolidated Shipbuilding Corp. has closed the Southern office at Miami which is open only during the winter season there and returned again to New York. Yachting enthusiasm in the South was greater this winter than ever before, according to Mr. Amory, and he thoroughly believes that there are busy days ahead for the boat builder. He knows this to be the case for the Consolidated plant since he brought back two or three very good orders.

New Wisconsin Catalog

Fully describing all of the many different models of Wisconsin marine motors, their new catalog can be said to be a most complete booklet. This has just been issued by the Wisconsin Motor Mfg. Co. of Milwaukee, Wis., and complete specifications of the motors are included in it. All the different machines are illustrated and dimensioned drawings of each are shown. Copies of this can be secured by request.

The Demand for Robert Bosch Products

Advices have reached us from many sources that there is an unprecedented demand for the various products of the Robert Bosch Magneto Company, New York, N. Y. Every Robert Bosch product is distinguished for its typically meritorious design and workmanship. All products bearing this name and trade-mark are leaders in their field, and unexcelled for premier quality and performance.

One of the latest additions to these products is the electric vibrating horn, which is finding wide favor and has a characteristic and distinct sound, produced by a scientific combination of two vibrators. This horn is a typical Robert Bosch product with all that this signifies. There is a natural confidence in every specialty made by this industrial institution, as uniformly satisfactory performance and extraordinary service have always distinguished these products. A national chain of authorized distributors and service stations makes it possible for the public to secure prompt and satisfactory service at all times. Interesting illustrated and descriptive literature will be supplied to any reader of MoToR BoatinG by writing direct to the Robert Bosch Magneto Company, 123 West 64th Street, New York, N. Y.

Federal Waters Are Free

In a test case to determine the rights of the South Park Commissioners of Chicago, Ill., to levy a charge for anchoring pleasure boats in the yacht harbors at Jackson Park,

(*Continued on page* 118)

Principal Racing Events of 1922

Club or Association	*Date*	*Place*	*Classes*	*Chairman of Race Committee*
Mississippi Valley Power Boat Association	July 1, 3 and 4	Peoria, Ill.	All Classses	A. C. Strong, Evanston, Ill.
New York Athletic Club	July 8	New York to Block Is.	Cruiser and Express Cruisers	Walter Sullivan, 221 E. 58th St., New York, N. Y.
Interlake Yachting Association	July 19-21	Put-in-Bay, Ohio	All Classes	A. R. Hackett, 3934 Avery Ave., Detroit, Mich.
Chicago Pageant of Progress	Aug. 3-6	Chicago, Ill.	Hydroplanes	Sheldon Clark, 910 Conway Bldg., Chicago, Ill.
New York Athletic Club, A. P. B. A. Handicap Cruiser Championship	Aug. 5	Long Island Sound	Cruiser and Express Cruisers	Walter Sullivan, 221 E. 58th St., New York, N. Y.
Buffalo Launch Club	Aug. 10, 11 and 12	Buffalo, N. Y.	All Classes	A. J. Utz, 887 Niagara St., Buffalo, N. Y.
Hamilton, Ont.	Aug. 17, 18 and 19	Hamilton, Ont.	32′ Runabout; 25′ Runabout	H. B. Greening, Hamilton, Ont.
Detroit Yacht Club	Aug. 26-Sept. 6	Detroit, Mich.	32′ Runabout; 25′ Gold Cup; Hydroplanes; Cruisers; Chance Race; Handicap Cruisers	F. R. Still, American Blower Co., Detroit, Mich.
Toronto Motor Boat Club	Sept. 3-7	Toronto, Ont.	Runabouts and Hydroplanes	C. R. Allison, 528 Bank of Hamilton Bldg., Toronto, Can.

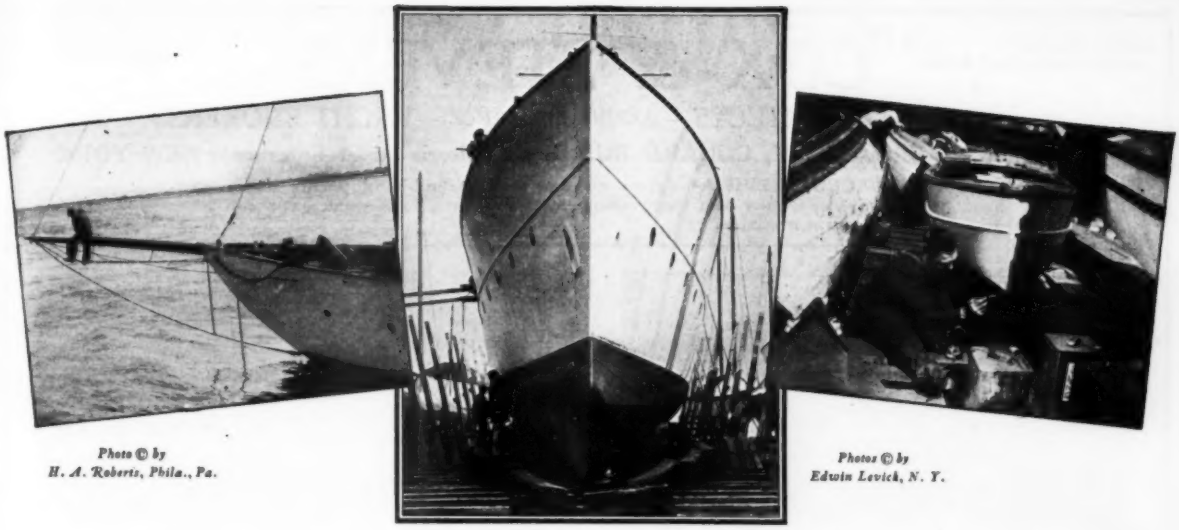


Photo © by H. A. Roberts, Phila., Pa.

Photos © by Edwin Levick, N. Y.

No need of a mid-season "Haul out"—if you use Valspar Marine Products this Spring

EVERY yachtsman has experienced the annoying necessity of having to "haul out" in mid season.

But today he avoids such interruptions. In the Spring he slaps two coats of Valentine's Yacht White on his boat—either gloss or dull finish. This high grade paint *stays* white throughout the season, and stands up through any weather.

Next he gives the bottom of his boat a thorough coat of Valspar Bronze Bottom Paint—a combination of the waterproof and durable Valspar with pure bronze powder. This absolutely anti-fouling and waterproof paint *will keep the bottom of your boat clean as a whistle all season.*

And for the hand-rails, davits and other metal fittings on your boat there is no paint more durable, weatherproof and rustproof than Valspar Aluminum Paint—a combination of the highest grade aluminum powder with the famous Waterproof Valspar Varnish.

And finally, for the spars and bright work, above and below decks—Valspar itself! Every yachtsman knows the qualities which have made Valspar the acknowledged leader of all marine varnishes. They know that it is absolutely waterproof and weatherproof—that Valspar *never turns white under any conditions.*

Use Valspar products each Spring when getting your boat ready to put overboard—you won't have to "haul out" again until the season is over!

VALENTINE & COMPANY

Largest Manufacturers of High Grade Varnishes in the World
Established 1832

New York Chicago Boston Toronto London Paris Amsterdam
W. P. FULLER & CO., Pacific Coast

This coupon is worth 20 to 80 cents

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The Varnish That Won't Turn White

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Valspar Bronze Bottom Paint .	☐
Valspar Aluminum Paint .	☐
Valspar Yacht White . . .	☐

I enclose dealer's name and stamps, amounting to 15c for each 35c sample can checked at left. (Only one sample of each product supplied at this special price. Write plainly).

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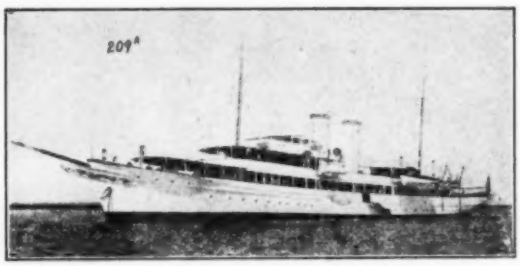
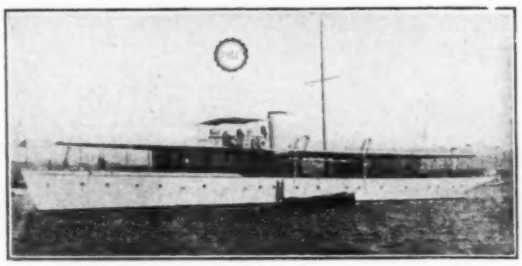
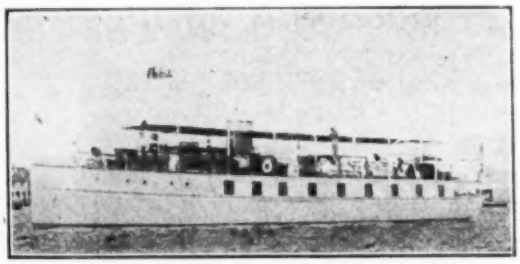
DEFLATION ACCOMPLISHED:—Prices on new and second-hand yachts and motor-boats, chartering, operating and overhauling costs are back to normal. We can offer every desirable yacht available.



No. 209—For Sale or Charter—Large sea going steam yacht. Exceptional speed. Palatial accommodation. Unusual opportunity. Several similar and smaller available craft. Cox & Stevens, 25 Broadway, New York.



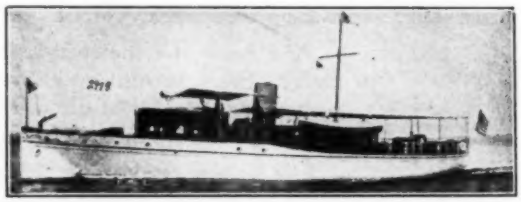
No. 1466—For Sale or Charter—Large and comfortable twin-screw steel cruising power yacht. Speed up to 17 miles. Dining saloon and social hall on deck; 3 double and 1 single staterooms, 3 bathrooms, etc. Handsomely fitted owner's quarters. Modern plumbing. Cox & Stevens, 25 Broadway, New York.



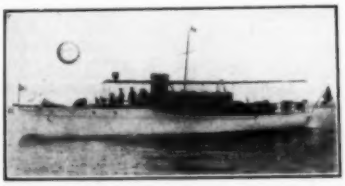
No. 1662—For Sale or Charter—Attractive 90 ft. twin-screw gasoline houseboat; speed 10-12 miles. Large saloon, four staterooms, two bathrooms; all conveniences. Handsomely furnished. Cox & Stevens, 25 Broadway, New York.

No. 40—For Sale or Charter—Steel steam yacht; 140 x 17.6 x 7.6 ft. Lawley built, 12-14 miles; triple expansion engine; new main engine, boiler 1916, condenser retubed and furnishings renewed 1920. Deckhouses contain dining saloon, social hall; owner's stateroom, two beds; three guests' staterooms (one double); two bathrooms. Cox & Stevens, Cunard Building, 25 Broadway, New York.

No. 3489—For Sale or Charter—Smart, modern, flush deck, twin-screw power yacht; 90 ft. over all. Excellent condition; remarkably able craft. Unusual deck space. Speed 13-14 miles; two 115 H.P. 6 cyl. Winton motors. Deck dining saloon; owner's stateroom (full width of vessel), one double and one single guest's stateroom, vestibule with berth, bathroom and guest's toilet room. Bargain for immediate disposal. Cox & Stevens, 25 Broadway, New York.



No. 2978—For Sale—Desirable twin-screw cruising power yacht; 80 x 14 x 4 ft. Speed 13 miles; two 50-60 H.P. Twentieth Century motors new 1919. Dining saloon, two double staterooms, bathroom and two toilets, galley, etc. Recently thoroughly overhauled at large expense. Cox & Stevens, 25 Broadway, New York.



No. 2690—Bargain—Attractive 63 ft. roomy bridge deck cruiser. Speed 11 miles. Saloon with two extension berths, double and single stateroom, bath and toilet room, galley full width of boat, etc. Cox & Stevens, 25 Broadway, New York.

No. 3477—Sale Only—Fast 43 ft. bridge deck cruiser; speed up to 17 miles; 130-150 H.P. 6 cyl. Speedway motor. Saloon, double stateroom, two toilets, galley, etc. Splendid boat for ferry or day service. Price low. Cox & Stevens, 25 Broadway, New York.

No. 2584—For Sale or Charter—High speed, twin-screw 62 ft. bridge deck cruiser. Lawley built. Speed up to 24 miles. Unusual accommodations include large saloon, two double staterooms, bathroom and two toilets. Cox & Stevens, 25 Broadway, N. Y.

PLANS, PHOTOGRAPHS AND PRICES ON REQUEST.

Advertising Index will be found on page 134

NAVAL ARCHITECTS
ENGINEERS
YACHT BROKERS
MARINE INSURANCE

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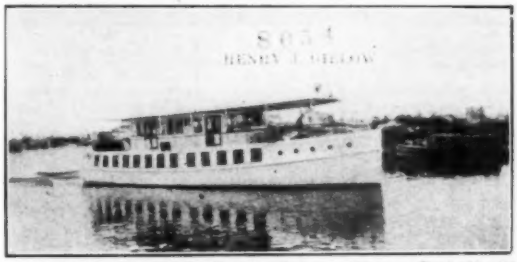
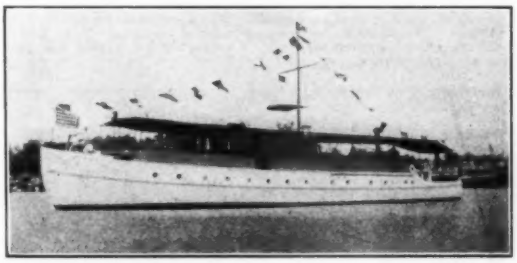
Plans and specifications for new yachts of any size or type should be prepared now to assure delivery for next year. Have plans of new yachts, all types, on file now.

We have a most complete and up-to-date list of steam and motor yachts of all sizes, sail, auxiliary, and houseboats, on file in our office, kept constantly up-to-date by a thorough and comprehensive canvass of the entire yachting field from time to time. We are in a position to submit full information on any type of boat, upon request.

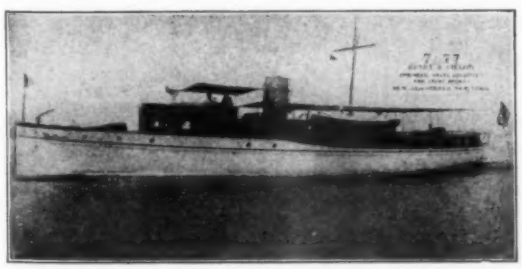
No. 7634—For Sale—Exceptional offering in Lawley designed and built cruiser, 43 ft. x 9 ft. 4 in. x 3 ft. 6 in. Double stateroom and saloon sleep 8. Steers and controls from deck saloon. 4 cylinder heavy duty Sterling motor. Speed 12-13 miles. Separate electric light generator. Built best materials regardless expense and all perfect condition. Fully equipped including tender. Able sea boat. Price reasonable. Henry J. Gielow, Inc., 25 West 43rd Street, New York City.



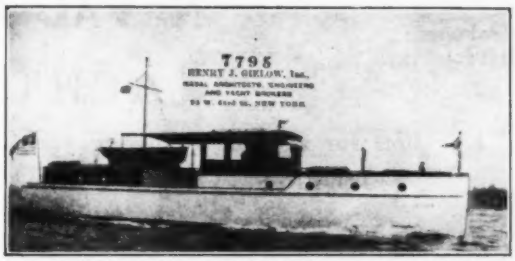
No. 8054—Located in Florida—Sale or Charter—Desirable 66 ft. cruising houseboat. One double and four single staterooms, bathroom. Large deck house containing lounging room. 50 H.P. motor. Henry J. Gielow, Inc., 25 West 43rd St., New York City.



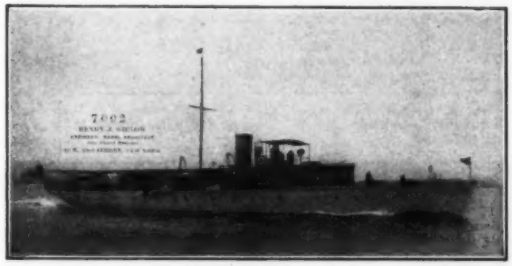
No. 8067—For Sale or Charter—Desirable twin-screw cruising houseboat suitable Florida and Northern waters. 88 ft. x 19 ft. x 3 ft. 6 in. 20th Century motors. Boat entirely overhauled and refitted 1920, three double and one single staterooms, saloon, deck saloon, sleep 8. Electric light and heating plants new 1920. Bath, two toilets. Has cruised Florida each year, good sea boat. Reasonable. Henry J. Gielow, Inc., 25 West 43rd Street, New York City.



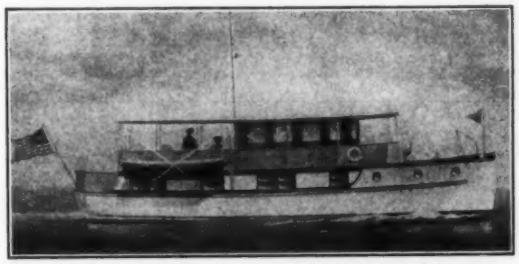
No. 7077—For Sale—Particularly desirable 80-foot twin-screw power yacht. "20th Century" 50-60 H.P. motors, new 1919. Deck dining room, two double staterooms, bathroom. All furnishings and equipment new 1919. Excellent condition. Henry J. Gielow, Inc., 25 W. 43rd St., New York City.



No. 7795—For Sale—45 ft. bridge deck cruiser. Built 1920. Speed 12-14 miles. 100 H.P. Van Blerck motor. One double stateroom, main saloon with 2 Pullman berths, toilet room, galley, etc. Price attractive. Henry J. Gielow, Inc., 25 W. 43rd Street, New York City.



No. 7002—For Sale or Charter—Finest yacht of type available. 138 ft. twin-screw power yacht. Two 300 H.P. Standard engines. Dining room and social hall on deck; three double and one single staterooms; two bathrooms. All furnishings new 1920. Henry J. Gielow, Inc., 25 W. 43rd St., New York City.



No. 8177—For Sale—New houseboat cruiser completed spring delivery. 48 ft. x 13 ft. 6 in. x 3 ft. One double, one single staterooms, large saloon with two berths and deck saloon 12 ft. x 8 ft., sleeps six. Crew stateroom forward. Heavy construction, finished mahogany and cream enameled. Delco lighting plant. 40-50 H.P. 20th Century engine. All best workmanship. Speed 9-10 miles. Popular type for Florida and Northern cruising. Price reasonable based on present reduced building cost. Henry J. Gielow, Inc., 25 West 43rd Street, New York City.

No. 8077—For Sale—Desirable cruising houseboat all in fine condition. Thoroughly overhauled 1921. Inspectable New York. 75 ft. x 16 ft. x 3 ft. 6 in. Winton motor, 6 cylinder 70 H.P. Three large staterooms, large deck saloon; newly furnished, screened throughout. Heavily built, able sea boat. Speed 10-11 miles. Price attractive. Henry J. Gielow, Inc., 25 West 43rd Street, New York City.

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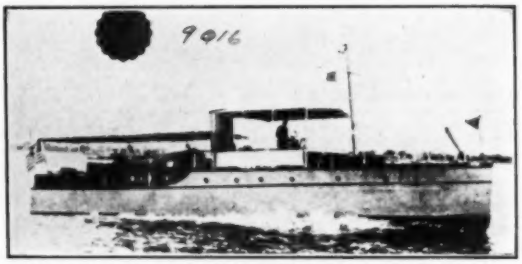
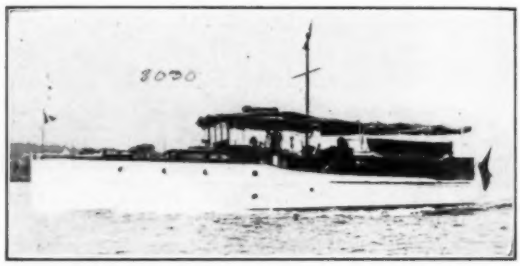
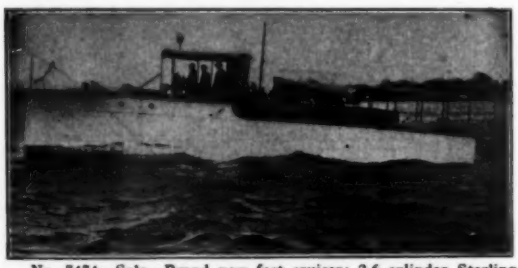
Offer for sale the following yachts, some of which are available for charter



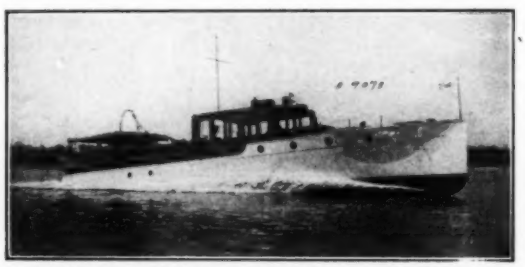
No. 9016—Sale—Charter—Desirable 60 ft. raised deck cruiser, thoroughly overhauled 1921. Two new 6 cylinder 90 H.P. Sterling motors.



No. 8030—Sale—50 ft. cruiser, built 1914; 2 double staterooms, saloon, etc. 6 cylinder 1921. 6 cylinder 90 H.P. Sterling motor.

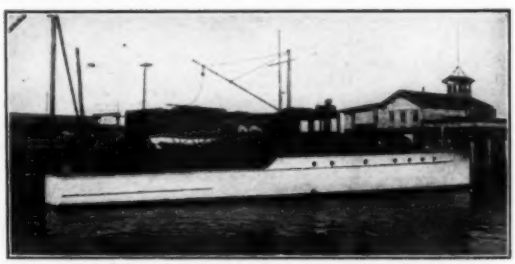


No. 7474—Sale—Brand new fast cruiser; 2-6 cylinder Sterling motors. Speed 21½ miles. All modern conveniences.

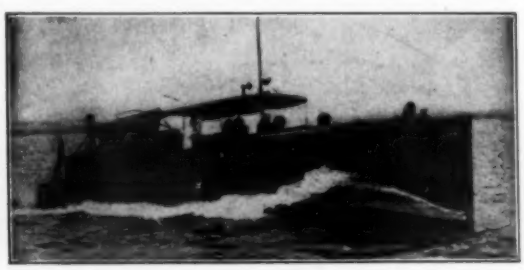


No. 9078—Sale or Charter—Fast 48 ft. express cruiser in commission. Immediate delivery—2 new 6 cylinder Van Blerck motors. Good accommodations. Thoroughly overhauled last year in all departments.

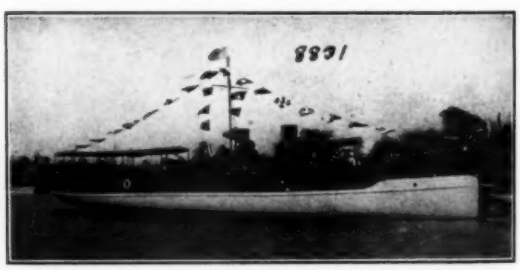
No. 8102—Sale—Charter—Most desirable raised deck cruiser available. Practically new. 81 ft. x 13 ft. x 5 ft. draft. Speed 15 miles. Electric light, hot water, heat and refrigerating plant.



No. 9075—For Sale—Desirable raised deck cruiser 70 ft. x 11 ft. x 4 ft. Good accommodations. Speed 23 miles.



No. 8978—For Sale—Raised deck semi-day cruiser. 200 H.P. Sterling motor. Speed 20 miles per hour. In the very best of condition. Price reasonable. Full particulars and plans from Tams & King, 52 Pine Street, New York.



No. 8831—Exceptionally fast cruiser; 74 ft. x 10 ft. 6 in. x 3 ft. 6 in. draft. New 300 H.P. 1920 6 cylinder Sterling motor; speed 25-29 miles. Good owner's accommodations. Further particulars from Tams & King, 52 Pine St., New York.

Advertising Index will be found on page 134

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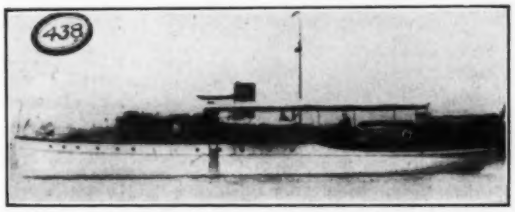
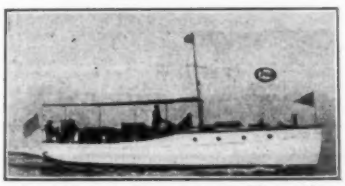
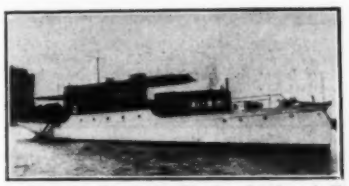
No. 1058—For Sale—desirable twin screw cruiser new 1921 93 ft. x 15 ft. x 5 ft. Powered with two 80-110 H.P. 6 cyl. Winton motors. Large deck dining saloon. Very commodious. Owner's double stateroom with large bath and dressing room. One double and single guest staterooms. Very attractively finished and equipped. Further particulars Henry C. Grebe & Co., Inc., 6 North Michigan Ave., Chicago, Ill.



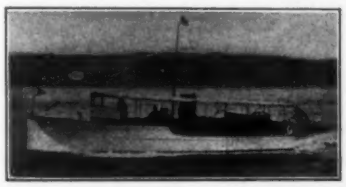
No. 438—For Sale—At a very attractive price. Twin screw cruiser 90 ft. x 15 ft. x 5 ft. heavily built of best materials and construction. Equipped with two heavy duty 20th Century motors. Deck dining saloon, very large deck space. Has two double and two single staterooms in owner's quarters, bath and two toilets. Very complete and the best of equipments. Henry C. Grebe & Co., Inc., 6 N. Michigan Ave., Chicago, Ill.



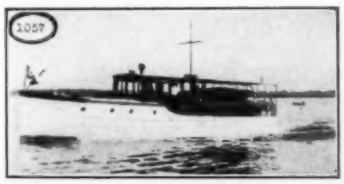
No. 768—For Sale—A 45 ft. Elco cruiser of excellent construction. Fully equipped for cruising. Accommodations consist of double stateroom aft; main saloon forward, with four berths, two toilets, large galley, etc. Motor controls from bridge. Henry C. Grebe & Co., Inc., 6 N. Michigan Ave., Chicago, Ill.



No. 38—For Sale—78 ft. Lawley built cruiser. Winton motor. Two commodious double staterooms. Two toilets. Dining saloon in deckhouse forward. A very able and modern boat. Henry C. Grebe & Co., Inc., 6 North Michigan Ave., Chicago, Ill.

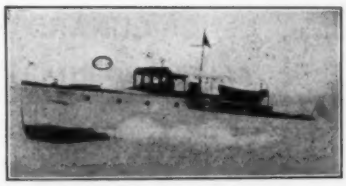


No. 1019—For Sale—60 ft. twin-screw express cruiser. Excellent seaboat. Speed up to 26 miles per hour. Accommodations excellent. Price reasonable. Henry C. Grebe & Co., Inc., 6 North Michigan Ave., Chicago, Ill.

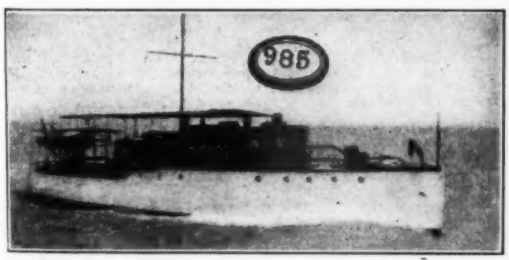


No. 1057—For Sale—Twin screw V-bottom Rochester cruiser. New 1921. 50 ft. x 12 ft. x 3 ft. Very complete and in excellent condition. Sleeps six comfortably in owner's quarters. Has comfortable deckhouse and roomy after deck. Reasonable price. Henry C. Grebe & Co., Inc., 6 N. Michigan Ave., Chicago, Ill.

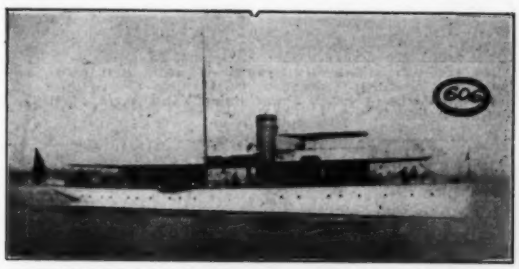
No. 173—For Sale—Very attractive bridge deck cruiser 55 ft. x 13 ft. x 4 ft. Powered with a 6 cylinder Sterling motor. Has large main saloon, forward double stateroom and bath in owner's quarters. Beautifully finished in mahogany. In excellent condition. Reasonable price. Henry C. Grebe & Co., Inc., 6 N. Michigan Ave., Chicago, Ill.



No. 1018—For Sale—54 ft. twin-screw express cruiser. Speed 20-25 miles per hour. Two toilets and shower bath. Well equipped and in excellent condition. Henry C. Grebe & Co., Inc., 6 North Michigan Ave., Chicago, Ill.



No. 985—For Sale—73 ft. x 13 ft. 6 in. x 2 ft. 6 in. twin-screw cruiser. Recent build. Two single and one double stateroom. Two toilets with showers. Dining saloon and deckhouse. A beautiful boat, mahogany finish throughout and as good as new. Henry C. Grebe & Co., Inc., 6 N. Michigan Ave., Chicago, Ill.



No. 606—For Sale—Modern steam yacht, 123 ft. x 17 ft. x 6 ft. draft. Speed up to sixteen miles. Three single and two double staterooms. Dining and social hall on deck. In excellent condition throughout. The finest yacht of her size available. Henry C. Grebe & Co., Inc., 6 North Michigan Ave., Chicago, Ill.

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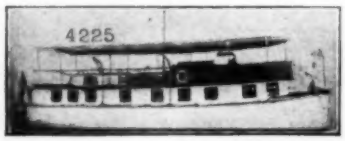
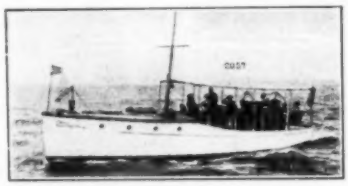
No. 2254—55 ft. bridge deck cruiser. Two double staterooms, main saloon, two toilet rooms. Two berths and toilet for crew. Sterling Motor. Speed 13-14 miles. Electric lights, etc. Splendid proposition.



No. 4225—Sale or Charter, 50 foot power houseboat. Two double and one single stateroom. Two berths in saloon. 32-37 H.P. Standard Motor. Speed 8 miles. Electric lights, etc.

No. 4270—Keel Schooner; 105 ft. x 73 ft. x 18 ft. 6 in. x 11 ft. 3 in. Designed and built by William Fife, Jr. Built of teak. Hull coppered. Three double staterooms, main saloon, bath, etc. Splendid proposition. Excellent seaboat. Inspectable New York.

No. 2014—70 ft. twin screw express cruiser. Designed and built by Luders. One double and two single staterooms. Main cabin. Two toilets, etc. Speed 20-25 miles.



No. 2057—45 foot Elco Cruiser. Double stateroom, main cabin with two upper and two lower berths; two toilets; two berths and toilet in engine room. 32-37 H.P. Standard Motor; Electric lights, etc.

No. 2034—52 ft. express cruiser. Double stateroom, main cabin. Two toilet rooms, etc. 200 H.P. motor. Speed up to 24 miles.

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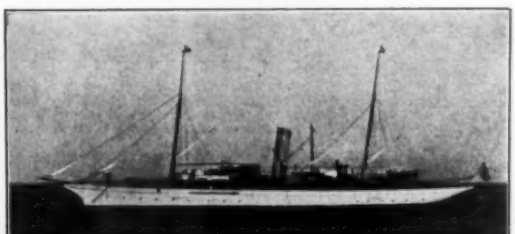
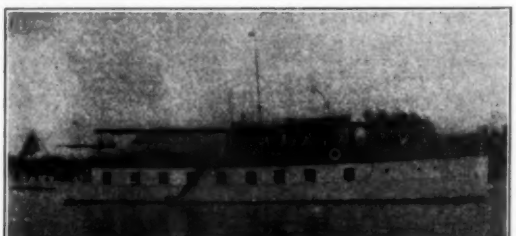
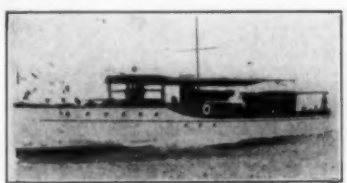


No. 1238—200 ft. steel sea going steam yacht. Best design and build. A-1 condition throughout. Oil burning. One of the finest vessels in the fleet. Frank Bowne Jones, Yacht Agent, 25 Broadway, New York.



No. 5097—For Sale or for Charter—One of the new Mathis 80-ft. Power House Yachts. Exceptional accommodations. Frank Bowne Jones, Yacht Agent, 25 Broadway, New York.



No. 1986—88 ft. gas yacht. Twin screw. Good speed. Exceptional opportunity. Frank Bowne Jones, Yacht Agent, 25 Broadway, New York City.

No. 5343—62 ft. twin-screw express cruiser. Designed and built by Lawley. Best cabin arrangement. Frank Bowne Jones, Yacht Agent, 25 Broadway, New York.

No. 2658—45 ft. Bridge Deck Cruiser—Built 1920—Accommodations include double stateroom and saloon with 2 Pullman berths. Price attractive. Frank Bowne Jones, Yacht Agent, 25 Broadway, New York.

Advertising Index will be found on page 134

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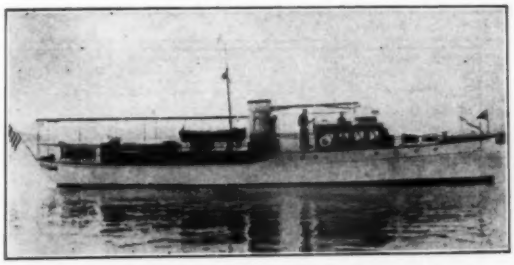
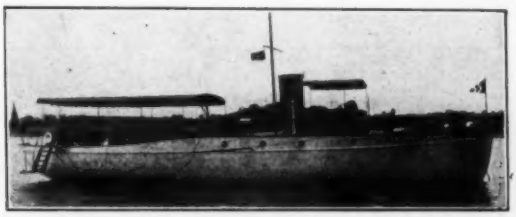


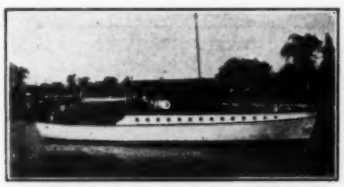
No. 2456—Excellent twin-screw power yacht, 72 ft. x 12.3; Lawley built, two 6 cylinder Wintons; speed 13 knots; two double staterooms, bathroom, dining saloon, etc.



No. 1949—Able raised deck cruiser, 62 ft. x 12.9; new 8 cylinder Sterling motor; speed 13½ miles. Single and double stateroom, main saloon, etc. In first class condition.

No. 2438—Handsome Express Cruiser, 87 x 12.2 ft.; mahogany planking; two 8 cylinder Speedway motors, speed 20-25 miles. Built under our supervision.

No. 2345—Patrol type. Twin-screw express cruiser, 60 x 10. Two 6 cylinder motors. Speed 25 knots. Very reasonable figure.



No. 1614—Raised deck cruiser, 57 ft. x 13 ft., Twentieth Century motor, 50 H.P. Three staterooms, saloon, etc. A1 condition.

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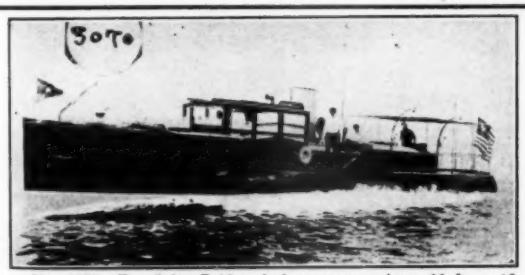
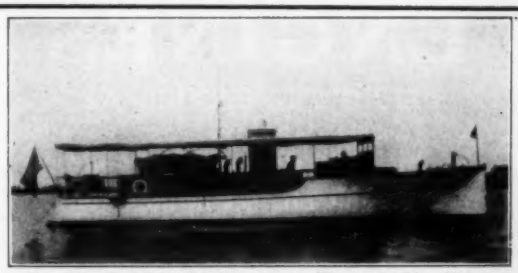
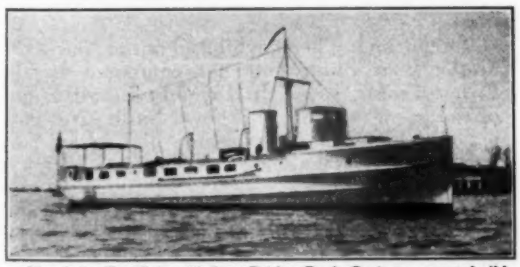


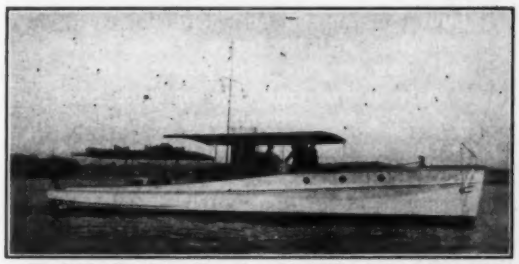
No. 3070—For Sale—Bridge deck express cruiser; 66 ft. x 12 ft. x 3 ft. 6 in. draft. Two Sterling motors. Speed up to 24 M.P.H. Ideal for fast ferry service. For further particulars, apply R. M. Haddock, Naval Architect and Yacht Broker, 50 East 42nd St., New York City.



No. 380—For Sale—52 ft. cruiser. Recent build. Has had almost no use since launching and has not been in the Government service. 150 H.P. Speedway engine. Will accommodate six. Apply R. M. Haddock, 50 East 42nd St., New York City.



No. 316—For Sale: 59 foot Bridge Deck Cruiser, recent build. 70-90 H.P. Sterling engine 1917. A very able boat, economical to run. Price very reasonable. Apply R. M. Haddock, 50 East 42nd St., New York City.



No. 3065—For Sale—Very desirable bridge deck cruiser; 55 ft. x 10 ft. x 3 ft. 6 in. draft. Large after cockpit. Sterling motor. Complete equipment. For further particulars apply R. M. Haddock, Naval Architect and Yacht Broker, 50 East 42nd St., New York City.

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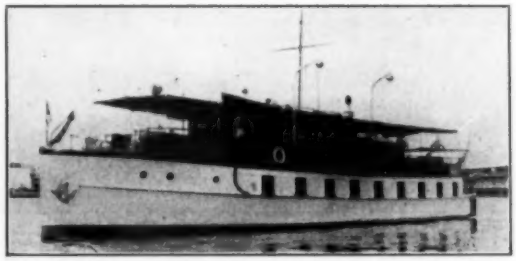
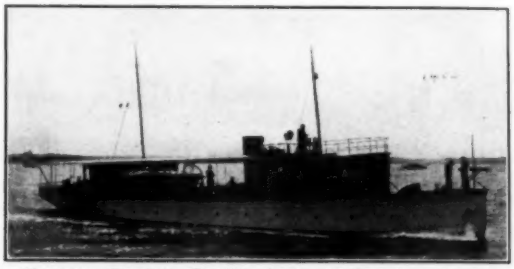
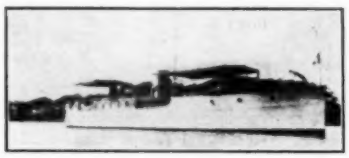


No. 1197—For Sale—Modern 80 ft. twin-screw houseboat; speed 13 miles, 4 double staterooms and saloon, 2 bathrooms. Beautifully furnished and one of the finest yachts afloat.

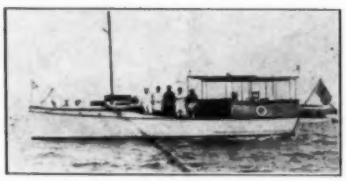


No. 1433—For Sale—Possible charter—98 ft. twin-screw power yacht; speed 12 miles, 1 single and 2 double staterooms, 2 bathrooms, dining saloon, etc. Very comfortable yacht, delivered in commission at an attractive price.

No. 666—For Sale—60 ft. cruiser; speed 11-12 miles, 1 double stateroom and saloon. Very seaworthy yacht which has had the best of care.



No. 1100—For Sale—60 ft. express cruiser; speed 25 miles, sleeping accommodations for 7 persons. Best of construction.



No. 1015—For Sale—43 ft. cruiser; speed 14 miles, 1 double stateroom and saloon. Excellent condition.

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Comanche has been exhibited at the New York Motor Boat Show and has competed in the Fisher Trophy race. It is widely known as one of the finest fast runabouts ever built. Not only a racing boat but a serviceable high speed runabout for general use.

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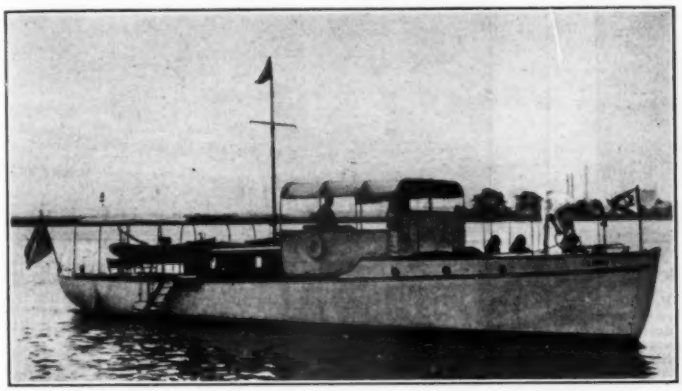
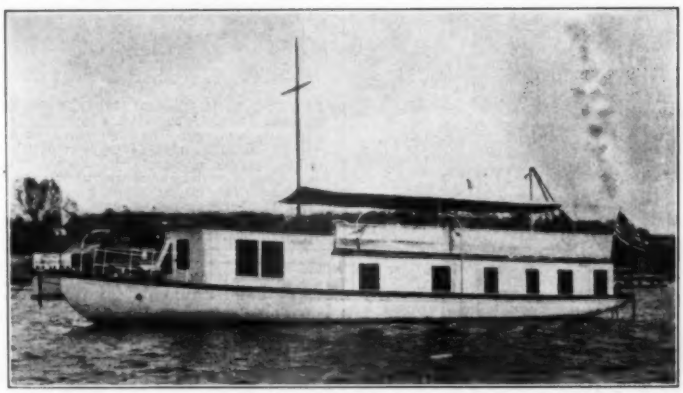


No. 1424—For Sale, low figure—Lawley built double planked cruiser, 52.9 x 8.6, six cylinder Buffalo motor; crew's quarters, engine room, galley, large main saloon, toilet, etc. Apply William Gardner & Co., 1 Broadway, New York.

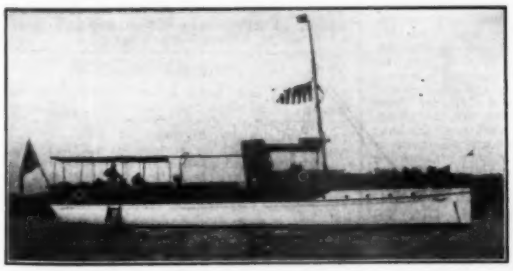


For Sale—The Commodious Houseboat "Roamer", 71 x 22 ft. (fully furnished). Salon 18 x 18 ft., bedroom 18 x 8 ft., 2 double staterooms 10 x 10 ft., 2 single staterooms, sleeping accommodations for 10 persons, galley 12 x 18 ft., 2 toilets, bathroom, fresh and salt water tanks, two 20 H.P. Ralaco engines, twin screw, General Electric dynamo. Boat can be seen at Gage Shipyard, Nyack. Wm. J. Kennedy, 41 Park Row, N. Y.

For Sale—Bargain—46 ft. x 9 ft. x 4½ ft. steam yacht compound condensing engine. Machinery and hull in excellent condition. Room 611, 90 West St., City.

No. 294.—For Sale—Runabout suitable for lake or river use, 40 ft. x 5½ ft. x 1 ft. 10 in. Double planked in cedar, mahogany decks and trimmings. Engine amidships. Seats 15. Very reliable power plant. Easily handled. Speed 18 miles. Located Lake Winnepesaukee. Price low. Apply John G. Alden, 148 State Street, Boston.

No. 227—For Sale—30 ft. sea sled. Built 1916 by Murray & Tregurtha at cost of $12,000. Two Van Blerck engines, 100 H.P. each. Speed up to 41 miles. Little used. Excellent condition, engines just having been completely overhauled. Can be delivered in commission at short notice. Apply John G. Alden, 148 State St., Boston.



For Sale—"Caliph", a 60 ft. ocean going cruiser, winner of Havana, Cuba, race. 35-40 H.P. Kent 4 cylinder, heavy duty engine. Speed 10-11 miles. Dimensions 60 ft. x 11½ ft. x 3½ ft. Completely refurnished and equipped 1921. Boat and machinery in first class condition. One power tender. Sleeps 6 comfortably. Price $10,000. Owner, S. Greenburg, 409 Edgecombe Ave., New York City.

MARINE ENGINE BARGAINS

All Engines Thoroughly Rebuilt and Guaranteed

75 H. P.	Standard 4 Cyl. 8 x 10	$1500.00
135 H. P.	Sterling 6 " 5½ x 6¾	1200.00
50-85 H. P.	" 6 " 5½ x 6¾	1050.00
30-50 H. P.	" 4 " 5½ x 6	750.00
125 H. P.	Van Blerck 6 Cyl. 6 x 6	1000.00
16-20 H. P.	Peerless, complete; Reverse Gear and Magneto	350.00
25-35 H. P.	Peerless, complete; Reverse Gear and Magneto	500.00
14-16 H. P.	Hall 2 Cyl., complete with Reverse Gear	300.00
28 H. P.	Racine 4 Cyl., 6 x 7	
28-36 H. P.	Red Wing 4 Cyl., 4½ x 5	
20 H. P.	Kermath Unit Plant, 1921 Model	
2	Lathrop 2 Cyl., 1 cyl., 8 H. P.	

Will accept low price for quick sale on 25 ft. mahogany trimmed runabout equipped with 24 H. P. high speed Wisconsin engine. Boat and engine like new.

Also about 50 other motors, all desirable makes and sizes. Write for complete list today.

Please bear in mind we do not sell any motors "As Is," as we have the best mechanics to rebuild and we will not ship a motor unless we can guarantee same.

Marine Engine Co. of Phila., Bourse Bldg., Philadelphia, Pa.

THE MOTOR BOATING MARKET PLACE

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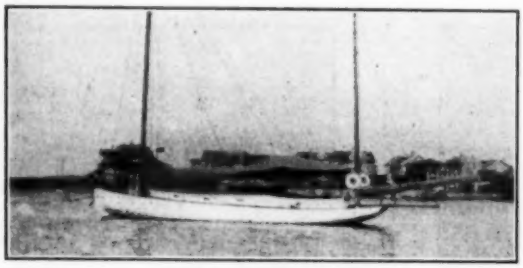
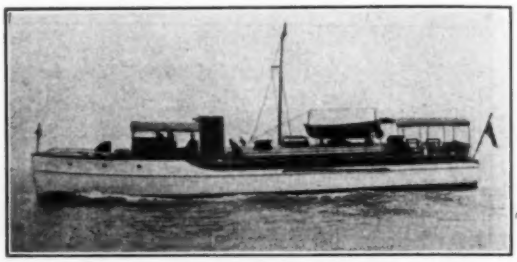
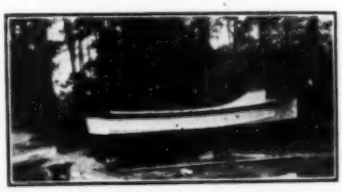


For Sale—Aux. centerboard yawl, 38 ft. x 12 ft. Open cabin. Sleeps 5, excellent ventilation. Fine galley. Shipmate ice chest. Toilet. Excellent sails. Rigging new last year. 10 H.P. Palmer 2 cyl. engine overhauled. Khaki covers throughout. Now housed, will equip and launch. Will take $2500. Further description upon request. Cannot be duplicated under $8000. Bargain for someone. Fine cruising boat; can go anywhere. O. H. Sherbrook, Blandford St., Boston, Mass.



For Sale—Yacht Celeritus, 61 ft. O. L. x 11 ft. 6 in. x 3 ft. 9 in. Designed by Swasey. Built by Jacobs 1916. Redesigned 1919. Motors overhauled 1920. Power plant, two Sterling eight cylinders 150/200 H.P. each. New power dingey built 1920. Perfect order. Complete inventory. Asking price $12,000.—Must be sold this Season—Apply Oliver, 417 Canal Street, New York.

No. 2345.—Elegant raised deck cruiser, 43 ft. x 38 ft. x 10 ft. x 3 ft. 6 in. Designed and built by Fred. Nock. Powered with a 4 cyl. 4 cycle Sterling engine. There is a stateroom forward and good sized main cabin with transom berths, amidships. The engine is alongside the companionway. Interior finish is mahogany and butternut. The arrangement of the cabin is very attractive. Inspection near York. J. H. Wallace, 5 Beekman St., New York.



CRUISER HULLS—LIMITED NUMBER—Handsome cruiser hulls, 30 x 8 x 2½, fast and seaworthy constructed by government at a cost of over $5,000 each; have never been used; built of juniper, copper riveted, cedar decks, steam bent oak ribs and combing; bronze rub streaks, chocks, cleats and bow stem; stern bearing, shoe and skeg, cast bronze; copper gas and water tanks, stuffing boxes, engine bed and shaft; price $400. Mr. Williams, 210 Tazewell St., Norfolk, Va.

For Sale: Launch, Mahogany, 22 ft. Fay & Bowen motor, Summer cabin. In first class condition; will sell cheap or exchange for good cat boat. Chris Locker, West Sayville, L. I., N. Y.

For Sale—Brand new round bottom, raised deck motor boat, hull 28 ft. x 8 ft. Harvey Duryee, Mattituck, N. Y.

Eastern Long Island, Peconic Bay and Long Island Sound illustrated booklet will be mailed upon receipt of 25c. SILKWORTH, Real Estate, Mattituck, N. Y.

WANTED—MAN TO SELL MARINE MOTORS ON COMMISSION.

Good commission paid live men to sell one of the leading marine motors in local territory. Quick seller. Price $375.00 complete with reverse gear. Box 211, MoToR BoatinG.

TRIMOUNT WHISTLE BLOWER OUTFITS

Blower runs by friction contact with engine flywheel. Whistle of brass, nickel-plated.

Made in 3 sizes.

TRIMOUNT ROTARY HAND BILGE PUMPS

All bronze composition. Suction lift 6 to 20 feet. A lifelong convenience.

Made in 3 sizes.

TRIMOUNT ROTARY POWER CO.
20 Heath Street Boston, Mass.
(Factory: 292 Whiting Ave., E. Dedham, Mass.)

For Sale—Motor Cruiser 38 ft. long, 9 ft. beam 3.5 ft. draft. Mahogany finish. Standard Engine, sleeps six, galley with Shipmate, toilet, clothes lockers, etc. Complete equipment. Ably designed, exceptional material and construction, safe and sound. One of the best and favorably known cruisers on Maine Coast and a real investment for $2500.00 cash. No less and no trades. A. B. Fels, Portland, Maine.

Raised Deck Cruiser 45 x 8½ 4 Cylinder Sterling Motor 65-85 H.P., electric starter, 2 cabins, toilet room and galley, dishes, glasses, ice-box, carpets, bedding, electric lights and whatever is needed. Very roomy and speedy boat. Complete to sail away. $3000.00. Kleinschmidt, 323 East 65th Street, New York.

FOR SALE—LIFE PRESERVERS, DIVING FLOATS, OARS, PADDLES, AND OTHER MARINE EQUIPMENT.
C. C. GALBRAITH & SON, Inc.
117-118 West Street, New York.

FOR SALE:—THIRTY HORSE POWER, four cylinder, heavy duty, Ralaco Engine 5" x 7", with built-in clutch—Overhauled and complete with coil, magneto, air compressor and spare parts. Wm. H. Howe, 495 Seneca St., Buffalo, N. Y.

FREE Illustrated Literatures. Outboards, New and Rebuilt Engines. Universal Joints, Pumps, Clutches, Gears, Hyde's, Gordon Reversible Propellers, etc. Canadian Boat & Engine Exchange, Toronto.

FOR SALE—21 ft. Hand V bottom runabout. Sterling motor, speed 20 M.P.H. Excellent condition. Further information apply S. Goodwin, 67 Wall St., New York City.

FLORIDA ISLANDS

Islands and water-front acreages in Florida Keys. Ideal sites for clubhouses, fishing camps, and private lodges. Some accessible by railroad; others by highway or boat. No better cruising and fishing waters on earth.

Also beautiful islands in Bay of Florida, Cape Sable district. Splendid water-front acreages on Florida Bay and Gulf of Mexico on mainland of Cape Sable, accessible from Miami by automobile over new highway. Cape Sable combines wonderful boating, fishing, and bathing waters with best duck-hunting in Florida in salt and fresh-water bays, lakes and waterways so numerous in that country. Prices and terms reasonable. Correspondence solicited.

Largest Cocoanut Grove in United States (35,000 trees) on Cape Sable with eight miles Gulf frontage. We have it for sale.

WATERS REALTY COMPANY
31 N.E. 2nd Ave., Miami, Florida

Advertising Index will be found on page 134

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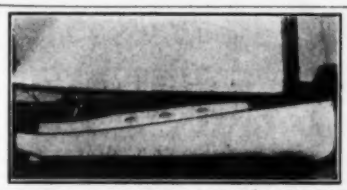
For Sale—Express cruiser, 57 ft. 9 in. long, 12 ft. beam. Has one large double and two single staterooms, and bath. Also large deck house. Beautifully equipped. Electric lighted. Built especially for Florida waters and long cruises. Speed 15 miles. Address Post Office Box 1081, Detroit, Mich.

No. 1359—Exceptional Bargain—Handsome 137 ft. twin screw, high speed, steam yacht. Deck dining saloon; two double staterooms, bathroom, two toilets, etc. Excellent opportunity to secure genuine bargain in high class craft adapted for fast ferry service. Cox & Stevens, 25 Broadway, New York. Telephone Whitehall 2700.

The handsome 66 ft. mahogany express cruiser pictured above is now available at a low figure. Built 1918 from design of Bowes & Mower, powered with twin 8-cylinder Sterlings. Accommodations for six in owner's party. Now undergoing spring overhaul. Inspectable, Philadelphia. Rigg & Wetherill, 1418 Walnut St., Philadelphia, Pa.



GENUINE "CROSBY" AUXILIARY CATS. Good, used, sound-tight boats, direct from "Crosby" shops. Best available shown here April-May delivery. Rosemond, 4th St., Greenport, N. Y.

FOR SALE—Bridge deck cruiser 40 x 9½ x 3, four cylinder Regal Engine, speed 8 knots, sleeps six to eight, toilet, electric lights, galley, etc. In good condition. Will sell at sacrifice. For particulars write R. P. McCLAMMY, WILMINGTON, N. C.

GET OUR LIST—6 cyl. 45-65 H.P. Sterling motor, $1,400; 24 H.P. Waterman, $150; 8-10 H.P. Monarch, $40; 4 H.P. Graves, $30; 2 H.P. Sintz, $20; Gray reverse gear $28. Many others. Jesiek Boat Co., Grand Rapids, Mich.

FOR SALE

Auxiliary Crosby cat, Gismonda—29 ft. o. a., 2 ft. 6 in. draft. Lathrop 7 H.P. 6 miles. Price $1200. Harry Sanford, 501 Fifth Ave., Tel. 969 Vanderbilt.

For Sale—Eight cylinder 150 H.P. high speed Sterling motor with starter and generator complete. Karl Farkas, General Research Corp., Providence, R. I.

For Sale—42 ft. "Gwan" hand design bridge deck cruiser, in first class condition, equipped with 350 H.P. Liberty motor, electric starter, lighting system, awnings, chairs, refrigerator, stove, outfit complete. Bargain. A. M. Ratigan, 160 East Grand Blvd., Detroit, Mich.

One 70 volt, 75 amp. direct connected Winton four cylinder generating plant, worth $1250.00, will take $500.00. One 110 volt, 39 amp. direct connected Winton four cylinder generating plant, worth $1250.00, will take $600.00. One 110 volt, 15 amp. direct connected one cylinder Carlisle & Finch generating plant, worth $350.00, will take $175.00. One 18 in. Rushmore search lamp, 35 amp., deck type, will take $125.00. One set large galv. running lamps, both oil and electric, suitable for vessel up to 100 ft., complete four lamps, $20.00. Let me quote you on marine search lamps, all sizes. Percy M. Child, 1110 14th St., N. W., Washington, D. C.

For Sale—Bridge Deck Cruiser 40 ft. x 10 ft., fully equipped, self starter, electric generator, seaworthy—bargain. Wm. Bowman, 317 Winslow Ave., Buffalo, N. Y.

A few pair of very powerful and clear Bausch & Lomb Prism Binoculars, 6 x 30 power, complete with case, etc. Worth $75.00, will take $40.00. Percy M. Child, 1110 14th St., N. W., Washington, D. C.

For Sale—25 ft. x 5 ft. Hand V bottom runabout. Deck and cockpit mahogany, white pine planking, nickel plated brass trimming. 35 H.P. motor. 22 m. p. h. Electric starting and lighting outfit. Auto control, fully equipped. $850.00. C. Fiedler, 138 Roesch Ave., Buffalo, N. Y.

OUTBOARD MOTORS

2 HP Evinrude, battery ignition.....$35.00
2 HP Evinrude, magneto ignition..... 55.00
2 HP Lockwood-Ash, magneto ignition.... 55.00
2 HP Waterman, magneto ignition..... 65.00

1 cyl., 2 cycle

3 HP Ferro.....$35.00
4 HP Gray..... 45.00
4 HP Lathrope..... 45.00
6 HP Williams..... 55.00
7 HP Fox..... 65.00

2 cyl., 2 cycle

6 HP Gray.....$55.00
6 HP Gile..... 65.00
7 HP Eagle..... 75.00
8 HP Racine..... 65.00
10 HP Northwestern..... 75.00
20 HP Emerson.....115.00

3 cyl., 2 cycle

12 HP LaCrosse.....$55.00
15 HP Elmore..... 65.00
12 HP Straubel heavy duty and gear....145.00
18 HP Fairbanks-Morse.....135.00
45 HP Vim, speed motor with gear.....185.00
5 HP Universal V-type.....$45.00
8 HP Dunn 2 cyl..... 65.00
12 HP Lamb 2 cyl.....145.00
12 HP Buffalo 4 cyl.....135.00
16 HP Dunn 4 cyl.....115.00
20 HP Erd 4 cyl.....185.00
30 HP New Doman 5 x 6.....275.00
45 HP Buffalo 4 cyl. 7 x 9 heavy duty with all supplies, reverse gear, air compressor, shaft, bearing and 36 in. bronze wheel, $945.00.

BADGER MOTOR COMPANY,
Milwaukee, Wis.

FOR SALE

A 6 cylinder, 60 to 80 H.P. Gasoline Engine. This engine was thoroughly overhauled and fitted up for testing purposes, with new white metal bearings, phosphor bronze sleeves, piston rings, etc.

It has a dual system of ignition and is equipped with a Bosch Magneto.

For further particulars write

The Holtzer-Cabot Electric Co.
Boston 19, Mass.

We have the following Marine Motors in stock which we will dispose of to first buyers at these bargain prices:

WISCONSIN 40 H.P., 4 cylinder, 4 cycle motor with electric starter, complete with generator and batteries, Bosch magneto, ignition equipment, propeller and tools.....$790.00

PIERCE-BUDD 18-25 H.P., 3 cylinder, 2 cycle motor with Bosch magneto and Impulse coupling, ignition equipment, propeller and tools. $375.00

RED WING 32-40 H.P., 4 cylinder, 4 cycle motor with Bosch magneto, electric starter, complete with generator and batteries, ignition equipment propeller and tools.....$700.00

KERMATH 20 H.P., 4 cylinder, 4 cycle motor with Kingston magneto, complete ignition equipment, propeller and tools.....$360.00

SCRIPPS—60-75 H.P., 6 cylinder, 4 cycle motor with electric starter, complete with generator and batteries, Bosch magneto, ignition equipment and propeller.....$1450.00

The above prices are subject to the Government Tax of 10%, f. o. b. cars, Salem, Ohio.

We also have a few Auto Tops complete with curtains, to fit a boat with cockpit 10 ft. 6 in. long and 6 ft. wide.....$75.00 each

Each one of these motors are brand new, have never been used.

MULLINS BODY CORPORATION
Boat Dept., Salem, Ohio.

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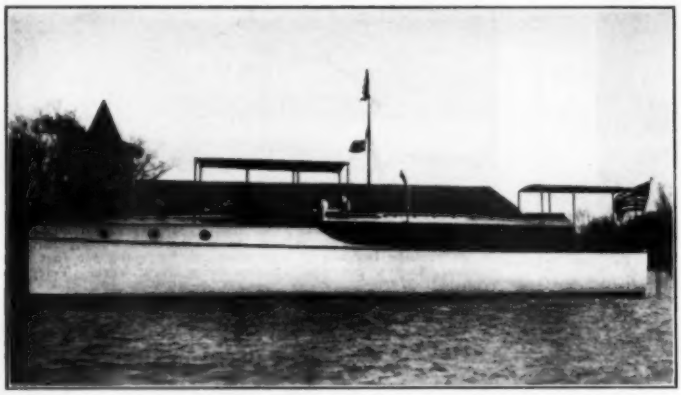
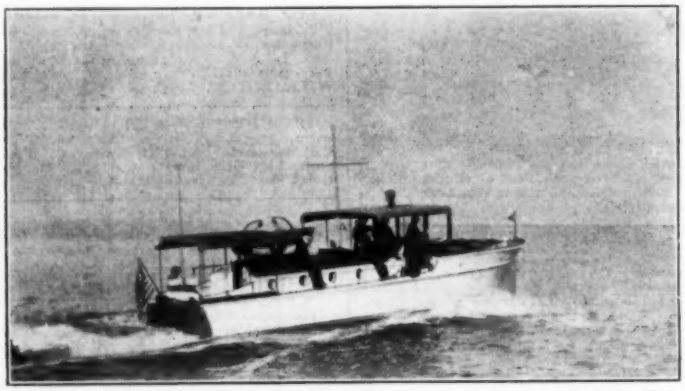


For Sale—Express cruiser, Emoh III designed by Frederick K. Lord, naval architect, and built by Greenport Basin and Construction Co., 1917, with new 6-cylinder 1921 Van Blerck Engine, 150 H.P. Ideal cruiser in A-1 condition in every respect; sleeping accommodations, three luxurious masters' Pullman berths with springs and mattresses; also extra pipe upper berth. Galley mahogany and arrangements perfect. Comfortable accommodations forward for crew of two—one sufficient to handle boat. Gasoline capacity, 170 gal.; water, 60 gal.; length, 43 ft.; beam, 8 ft. 6 in.; draft, 3 ft. Extreme speed on trial trip, 24-7/10 miles. Best bargain for this class of boat in the market. Now in commission, ready to be shown in New York and nearby waters. Inquire Box 212, MoToR BoatinG.



For Sale—Great Lakes express cruiser; 50 ft. x 10 ft. 6 in. x 39 in. 8 cylinder Van Blerck motor. Cruising speed 16 M.P.H., maximum 22 M.P.H. Sleeps 6 to 8 and crew. In service one season. Excellent condition. Could be launched about May 1. Fully found, including speedway alcohol range, electric lights, powerful searchlight, dinghy, etc. Inspection any time at Rochester, N. Y. Erdle Perforating Company, 171 York St., Rochester, N. Y.

No. 4396—For Sale—One of the best of the Florida Power Houseboats. Dimensions 70 ft. x 20 ft. x 3½ ft. Built 1916. Twin-screw; 2 double, 2 single staterooms and large saloon; 2 baths. Offered at price away below value. Inspectable in Florida but will be delivered in commission at any northern port. Frank Bowne Jones, agent, Cunard Building, 25 Broadway, New York.

For Sale—New 26 x 8 x 2 ft. 3 in. raised deck cruiser, hand design, powered with 6 cylinder motor. Speed about 15 miles. To be seen at Daslen & Larson Boat Works, 151st St. and Hudson River, New York City.

For Sale—25-55 H.P. F. H. Sterling. This engine has been used only four months in yacht and has had best possible care. Price $1500. Francis Minot, 56 Fenway, Boston, Mass.

Boat Wanted—Runabout 20 to 28 ft., with complete equipment. Speed 18 miles or better, good running order. Wm. Reichert, Motor Square Hotel, Pittsburgh, Pa.

For Sale—Houseboat, on St. Lawrence River. Nine staterooms, three baths, steam heat, beautiful and complete, thoroughly sound and seaworthy. Address Box 210 MoToR BoatinG.

For Sale—11 H.P. 2 cylinder, 2 cycle Ferro engine, overhauled, new impulse high tension magneto, shaft stuffing box and propeller—no carburetor, $250. M. O. Whitney, 45 East St., Hartford, Conn.

Elco express, 30 ft. x 6½ ft., mahogany finish, equipped with 65 H.P. Elco engine, self starter, electric sailing lights and powerful search light, speed 25 miles. Boat is in excellent condition, used only 3 months. Will sell at reasonable figure. E. M. Timmins, 207 Produce Exchange, N. Y. C. Telephone 5030 Bowling Green.

Wanted—Man to assist in operating motor boat. Address Louis H. Strouse, c/o Flaherty, Turner & Strouse, 2 Rector St., New York City.

Wanted—Motor boat 25 feet, part cabin preferred, must be in first class condition, no junk. Prefer boat south shore, L. I. vicinity. Address Box 214, MoToR BoatinG.

For Sale or Charter—New 50 ft. cruiser; sleeps 10; fully equipped. G. A. Roland, 14 Bittman St., Maspeth, L. I., N. Y.

YACHTMEN'S SERVICE AGENCY

31′ x 9′ 6″ x 3′ Raised Deck, 15 H.P. Vahn.
40′ x 9′ 6″ x 3′ Raised Deck, 30 H.P. Hall.
38′ x 9′ 6″ x 3′ Raised Deck, 35 H.P. Peerless
Two 32′ Elco Cruisers.
40′ 6″ x 9′ 3″ x 2′ 6″ Bridge Deck, 40 H.P. Waukesha.
40′ Rochester Cruiser.
48′—50′—52′—60′—80′—106′ House Boats.
Many other types and size Yachts and Commercial Boats.

1233 Real Estate Trust Bldg.
Philadelphia, Pa.

Early Spring Bargains

The early bird catches the worm. Here is your chance. Send for our complete list and prices.

Gray	**4½**	**H. P. Model R Complete.**
Sterling	**10**	**H. P. Unit power plant.**
Frisbie	**10**	**H. P. Two cyl. unit.**
Gray	**12**	**H. P. Model T, 1 Cyl. motor.**
Gray	**14**	**H. P. Model T, 2 Cyl. motor.**
Scripps	**20**	**H. P. Model H, Unit motor.**
Doman	**30**	**H. P. Heavy duty unit complete.**
Sterling	**40**	**H. P. Model B, Unit power plant.**

We Are Authorized Distributors of:

STERLING KERMATH STEARNS
FRISBIE UNIVERSAL
EVINRUDE JOHNSON
Marine Motors
HYDE PROPELLERS JOES REVERSE GEARS

W. L. MASTERS & CO., 231 N. State St., Chicago, Ill.

Advertising Index will be found on page 134

NAVAL ARCHITECTS & YACHT BROKERS

Thomas D. Bowes, M. E.
NAVAL ARCHITECT AND ENGINEER
Offices
Lafayette Bldg., Chestnut and Fifth Sts.
PHILADELPHIA, PA.

BURGESS & PAINE
NAVAL ARCHITECTS
YACHT BROKERS
131 STATE ST. BOSTON, MASS.

COX & STEVENS
Naval Architects and Engineers
Yacht Brokers
25 Broadway, Cunard Building
(Morris St. Entrance), New York City
Telephone 2700 Whitehall

EDWARD CARROLL NAVAL ENGINEER
18 years experience, steel and wood construction with leading yacht designers and U. S. Navy.
Diesel Engine Specialist
I charge a fixed price for my services; not a percentage of cost. This, with my knowledge of the markets, insures a maximum of value at minimum cost. In justice to yourself, let me submit a sketch to your requirements.
2830 Kansas Road, "Fairview", Camden, N. J.

B. T. DOBSON
Naval Architect Yacht Broker
(P. O. Box 407) New Bedford, Mass.
Designer of Sailing Craft, Auxiliaries and Motor Boats. Specialist in V-Bottom Type.

William H. Hand, Jr.
NAVAL ARCHITECT
NEW BEDFORD, MASS.
HAND-V-BOTTOM DESIGNS
Every design, now as always, my personal work.
Send stamp for catalog illustrating forty-three typical Hand-V-Bottom designs.

R. M. HADDOCK
NAVAL ARCHITECT
Sail or Power Yachts, Houseboats and Commercial Vessels
Yacht Broker Sales and Chartering
50 East 42nd St. New York City

FREDERICK K. LORD
NAVAL ARCHITECT
120 BROADWAY NEW YORK

Spark Intensifiers Not Essential

(*Continued from page 36*)

IGNITION is one of the most important factors to the satisfactory operation of an internal combustion engine. Faulty ignition will cause irregular operation, a loss of flexibility and will be evidenced more in the motors running without stopping it than any other trouble commonly met with. The source of spark, be it a magneto or a battery system, invariably leaves the factory only after an exhaustive test and is in good condition when received. Ignition troubles due to cracked porcelains or broken down mica insulation in the spark plug, and improperly adjusted or oily spark gaps are the most common.

There are several devices on the market under the general name of spark intensifiers, all of which employ the auxiliary spark gap idea in one way or another. The manufacturers and their salesmen exploit these devices as a wonderful invention for increasing the efficiency of any spark plug and making possible the satisfactory use of cracked and oily plugs. The demonstrator has a stand upon which he places a plug, good or bad, and produces a spark across a 1/32-inch gap at atmospheric pressure. Under operating conditions the mixture is compressed to about five times atmospheric pressure and as the resistance encountered by the spark at the gap is in proportion to the density of the air (mixture) at spark gap the distance between points should be increased to 5/32 inch to equal operating conditions. The spark from a ½-inch coil, the size generally used for ignition purposes, will easily jump this gap and produce a good spark.

With good plugs properly adjusted the writer has found no advantage in using any of the devices sold as spark intensifiers. In one instance, using a well advertised intensifier, it was exceedingly hard to start the motor when cold, and the owner used to disconnect the device until the motor had warmed up. The motor started nicely without the auxiliary gaps and no difference in the power or operation of the motor was noticeable when the device was used on the plugs. Last heard of—the six little brass affairs were on the garage window sill.

On a certain boat there are four slightly used intensifiers of another make all packed away in the box in which they came and stowed in a locker. Occasionally the chief gets them out to look at and show his friends how little he cares for $5.00. They were used for a day or two and laid away as souvenirs.

Under some conditions these auxiliary spark gap devices are valuable. They seem to improve the operation of an oily plug after the motor is running and if the gap between the points is close enough a plug with a cracked or broken porcelain may be made to fire. Attached to a good plug you can't tell the difference. With the device in use you can see the spark jump the short gap and in this way observe the time of the spark without disconnecting wires.

Any device which causes an open spark outside the motor cylinder is not safe to use on a mtor which is housed up, under a hatch, or in the cabin. There is bound to be a certain amount of drip from the carbureter at times, and you know the result of a spark and air saturated with gasoline vapor. If you use an intensifier at all get the kind in which the auxiliary gap is inclosed in glass. Then there will be no danger from fire.

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Vacation Camps
offer a glorious summer in the open for your boy or girl, with the care and companionship of experienced instructors.

Moderate Priced Camp
for your boy, 9-16, under experienced leaders, with ample equipment, near enough to visit him once or twice. A complete program, including swimming, boating, life-saving,
Hikes, Cruises, Camping
Season—July 3 — Sept. 2. $200. Get booklet.
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ALGONQUIN LODGE for older boys. On Lake Memphremagog (thirty miles long), Newport, Vermont. A carefully managed camp for boys, fifteen years and over. Enrollment limited. (By special arrangement three boys 8 to 12 may be accepted as companions to one 10. Special councilor will be assigned these). 150 acres. Unsurpassed for healthfulness and natural beauty. Physician. Telephone. Experienced councilors. Tutoring. Swimming. Tennis. Golf. Riding. Canoeing. Fishing. Special trips unlimited. References required. Booklet and correspondence.
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EAGLE'S NEST CAMP for Girls
WAYNESVILLE, N. C.
Invites inquiry from parents seeking a small camp of high standards. Booklet upon request.
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This Columbia "Hot Shot" Dry Battery has advantages over any substitute that has ever been tried for motor boat ignition and lighting

Delivers its full ignition current while you are starting up. And if for any reason your engine slows down, the ignition spark continues snappy as ever! Saves time and temper.

The Columbia "Hot Shot" Dry Battery costs little, lasts long, and is obtainable everywhere when you finally need to replace.

No machine parts to keep tinkering with, or to call for expensive replacement — no cell connectors to fuss over — just a single solid package of pep

Get a Columbia "Hot Shot" for ignition on your motor boat today, and take another along for lighting.

Columbia Dry Batteries for all purposes are for sale everywhere at marine supply houses; electrical, hardware, and auto accessory shops; garages; general stores.

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LONG ISLAND CITY, N. Y.
ATLANTA CLEVELAND CHICAGO
KANSAS CITY SAN FRANCISCO

Columbia Dry Batteries
—they last longer

The Necessity of Organization

(*Continued from page* 11)

tions attempt to solve. A great deal of standardization is possible in the sport which would greatly increase the enjoyment of boating, and the organization of clubs, both locally and nationally, can accomplish much good along these lines. The American Power Boat Association also is doing much work along legislative lines which benefits the motor boatmen. Then in the question of standard racing rules and the selection of non-conflicting racing dates, a central organization of clubs functions much more efficiently than the individual clubs can ever hope to.

As trustees, so to speak, of the many historic racing trophies, of which we have a number in this country now, the A.P.B.A. and other somewhat similar organizations perform an important work. In the question of the placing of buoys and other aids to navigation for motor boatmen, the work of the A. P. B. A. has been worth to the clubs, every cent they have paid to it as dues.

There are countless other ways in which the national bodies are of great benefit to the whole sport of yachting and motor boating generally.

Much depends upon the basis of organization of the club. Some clubs having the title of this or that yacht club, are formed for the promotion of certain schemes, racing or other, generally, to boost, financially or otherwise, the so called officers. Such clubs have no club house and generally no tangible property, few if any yachts, but often a very efficient publicity committee of newspaper reporters, who are used to good advantages to promote the good name of the officers, the home city or whatever purpose the organization may have had for its existence. These clubs seem to exist and thrive on publicity, generally distorted, but are, in reality, leeches on the sport of yachting and serve no good purpose. Their principal activity is the annual election of officers and they are always more active in the winter season telling about their plans for the summer but when summer comes business always prevents the officers from being present.

The name selected for the club is very important. It should mean something. It should be more than any old word. A name such as the Indian Launch Club, the Harbor Yacht Club, or Dock Rats Motor Boat Club should not be chosen. The name should if possible, be directly related to the locality, but in a way which will give the name national or at least sectional significance, for example: the Detroit Yacht Club, Lake George Yacht Club, Motor Boat Club of Savannah, Buffalo Launch Club, although the word launch is an obsolete one and should not be used in connection with a newly organized club.

A club, to be successful, must be properly organized. Organization is dependent upon a proper constitution and by-laws. Generally speaking, these should be as brief and as much to the point as possible. More clubs have gone on the rocks on account of too many rules than from any other cause. Laws that are complex and unworkable are worse than no laws at all.

A club's constitution is its fundamental laws. Its by-laws are its rules and regulations. Naturally, the former is by far the more important. The constitution of a yacht club should bear on such items as the duties of the officers, election of members, voting power, classes of membership, organization and duties of committees, method of financing the club, etc. The by-laws should take up the question of fees and dues, of matters pertaining to regular and annual meetings, club flag, matters relating to the fleet and club property, house rules, indebtedness of members, resignations, conduct of members, etc. Such matters as yachting, etiquette, uniforms and dress, racing rules, yacht routine, and the like, should be a part of the club's organization, although not necessarily included directly in the by-laws.

The general organization of the best clubs in the country is more or less uniform, although in certain features, there may be a slight difference on account of specific local conditions. Any club can well afford to base its constitution and by-laws after those of such clubs as the New York Yacht Club, the Columbia Yacht Club, Manhasset Bay Yacht Club, Boston Yacht Club, Philadelphia Yacht Club, Larchmont Yacht Club, and many others. Most of these clubs have now been in existence for more than half a century and therefore the fundamentals of their organization are so well established and have proven so workable that they should be copied as far as possible.

Taking up the various features of a typical constitution, article by article, we find that Article I always deals with the club's name and in many instances describes the corporate seal of the club.

Article II should be a brief statement of the objects of the club. Quite naturally, objects of all yacht and motor boat clubs are practically the same, namely: to encourage the sport of yachting, to promote the science of seamanship and navigation and to provide and maintain a suitable club house and anchorage for the recreation and use of the members.

(*Continued on page* 58)

Advertising Index will be found on page 134

HALL-SCOTT
MARINE ENGINES

P. O. BOX 301

THE HAMILTON MOTOR BOAT CLUB

HAMILTON, ONT.

Sept. 18th, 1921.

The Hall-Scott Motor Car Company, Inc.,
885-895 Niagara Street,
Buffalo, N. Y.

ATTENTION: MR. ARTHUR UTZ

Gentlemen:-

You once asked for my opinion of your Marine Motors, and my reply was that I felt incompetent to voice my opinion at that time, as I had only had a few rides in boats powered with your Marine Motors.

As you perhaps know, I have had the opportunity to fly in planes fitted with power plants of the most distinctive and refined designs both here and abroad, and during such flights, I was able to observe the wonderful consistency of the modern power plants of the combustion motor type, but seeing one of your 200 H. P. Marine Motors being pushed wide open through a gruelling 150 mile contest in the last Wood-Fisher Race, was a revelation to me.

The way the power plant in the "Nick-Nack" performed during said Race was far above anything I have ever seen executed by either Marine or Aviation Motors. During the entire period of the 150 mile race, the throttle, as well as the ignition, was fixed wide open. The speed of the motor at the beginning of the race was 1950 R. P. M., which gradually slightly increased, and at the finish of the 150 miles, the tachometer showed 1975 R.P.M. The variations during the entire race were very slight, and seemed to be entirely due to the different air conditions on the course. At no time did Mr. Hoyt have to do anything to the motor, either in the way of repair or adjustment, other than the filling of oil and gasoline.

Identically did the motor behave during the Toronto Races, and during one of the races, when we had to encounter a very heavy sea in which every participating boat was more or less damaged, the motor functioned without reproach, and at all times answered the throttle.

Please accept my sincere congratulations for this result of many years patient experimentation and development.

Yours very truly,
F. G. ERICSON
COMMODORE HAMILTON MOTOR BOAT CLUB

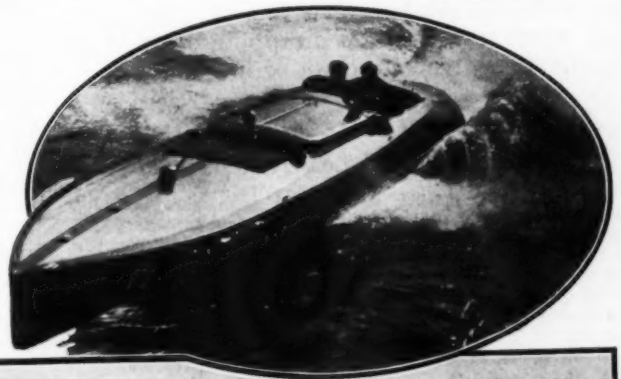
FGE-R

"a revelation"

FEW men know fast boats and good motors any better than Commodore F. G. Ericson of the Hamilton Motor Boat Club. Sportsman, racing enthusiast and owner of fast boats himself, Ericson is qualified as an expert when he says the performance of the Hall-Scott "was a revelation to me."

Hall-Scott Marine Engines are a revelation to every observer who sees them pushed to the limit. For there seems to be no limit to their endurance in high duty service.

In both runabouts and cruisers Hall-Scott Marine Engines have demonstrated that the exhilaration of owning a fast boat does not require the sacrifice of reliability, durability or economy.



"NICK NACK"—World's fastest displacement runabout, powered with a single marine engine. 200 H.P. Hall-Scott

If you would like to own a thoroughly satisfactory boat—always interesting, always ready for a race or a record,—let us offer tangible evidence in the details and performances of Hall-Scott powered boats. Write for Catalogs.

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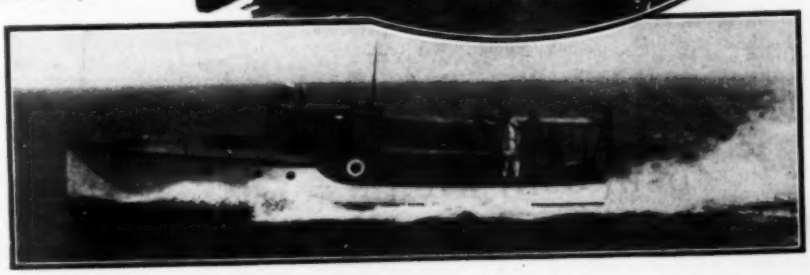

The boat at the right is "WINIFRED," the fastest cruiser on the Pacific Coast. 43 ft. x 10 ft. Speed 30.9 M.P.H. Two 6 cyl. 200 H.P. Hall-Scotts

Let us send you dimensions, speed and motor equipment of other Hall-Scott powered boats, so you may see what is possible for your boat

DOMAN
OSHKOSH, WIS.

Our New L M-4

Supplies Doman Dependability for Medium Sized Boats

Doman L M-4. 4 cyl. 3⅛ x 4½" 15-18 H.P.

MIDWAY between the little kickers and the big husky cruiser and work boat engines, there's a great demand for an engine of real quality and dependability for fast runabouts and cruisers up to 30 ft. The new Doman L M-4 meets this demand to a T because it is up to the minute in design, completely equipped and we believe is the best engine of its size ever built.

For smooth running, quietness, flexibility and fuel economy the L M-4 is in a class by itself. You won't find a single disappointment in its specifications, its equipment or in its service.

And Then There's the Single Cylinder 4 H.P. Doman Model K

We know the market is crowded with cheaper single cylinder engines but still we find a good demand for this 4 H.P. Doman. For one thing, the fisherman and work-boatman who use this size motor know that dependability is worth all it costs. And a lot of other boatmen are too wise to invite trouble, even though their boats are not large or hard to drive. This is a real Doman, the product of 28 years of marine engine experience.

Write today for full specifications and prices on these and other Doman engines. 4 to 50 *H.P.*

UNIVERSAL PRODUCTS CO.

Doman Engine Division

OSHKOSH, WIS.

The Necessity of Organization

(*Continued from page* 56)

The next article should name officers of the club. As far as the principal officers are concerned there is no variance in the organization of any of our principal clubs. The chief executive officer of a yacht club is always the Commodore. Following the Commodore in rank, comes the Vice-Commodore and then the Rear Commodore. These three constitute what are known as the flag officers of the club. Every club also has a secretary and a treasurer. Sometimes the duties of the secretary and treasurer are combined into one officer, known as the Secretary-Treasurer. However, more often, this work is divided up into more than two officers. We find, in many clubs, officers known as Recording-Secretary, Corresponding-Secretary, Financial-Secretary, and the like.

In every club we find provision made for a Board of Directors, which is most commonly called the Board of Governors, and sometimes the Board of Trustees. The Board of Governors generally consists of three flag officers, the Secretary and Treasurer, and from two to five other persons who are not other officers of the club.

In many clubs, the next article in the constitution takes up the forms of membership, although in some instances, there is only one class of membership so that it is not necessary to give up a full article on this subject. However, the tendency to-day in yacht clubs is to make provision for several grades of membership.

Of course, the great majority of members in any club will fall into the class known as active members. This is not a particularly good name as these members should be known as resident members, rather than active members. A provision is generally made for such other grades as: Honorary, Non-resident, Associate, Junior, and Life members.

The honorary membership is, as the name implies, one which is conferred upon certain people on account of their official position or standing or for various other reasons where the club desires to be courteous or extend a particular honor on some one. These members would naturally be exempt from regular dues, but are not entitled to vote or hold office.

Non-resident members are those residing more than a certain distance away from the club's headquarters. Associate members may be those who are members of another yacht club. Junior membership is, as the name leads one to believe, open to those who, on account of their age, do not qualify for active membership. Junior membership is ordinarily limited between the ages of sixteen and twenty. Life membership generally implies the payment of a sum of money at one time to cover initiation fee and dues for a considerable period of time. However some clubs' constitutions make the provision that after a man has been an active member for a considerable length of time, usually, twenty years, he automatically becomes a life member and is not obliged to pay further dues. Generally speaking, only active and life members of the club enjoy voting privileges or may hold office.

The article of the constitution to follow, almost always takes up the election of officers. Almost without exception, the flag officers and secretary and treasurer are elected annually for a period of one year. The other members of the Board of Governors are often elected for a period of two or three years, but the dates of their election are usually staggered so that not more than one or two of them go out of office each year. This makes it certain that there are always a few members of a newly elected Board of Governors who remain over from the previous administration and are therefore experienced and more familiar with the club's routine.

The next article should take up the duties of the officers. As previously mentioned, the Commodore is the chief executive officer of the club and performs such duties as ordinarily fall to the office of President as well as additional duties which are related to the yacht club. The Commodore always commands the Squadron and presides at all meetings of the club. He also appoints a fleet captain and a fleet surgeon. In many instances, the Commodore appoints all the important committees.

The Vice-Commodore assists the Commodore in the performance of his duty and in his absence acts for him. The Rear Commodore assists the Vice-Commodore and in his absence acts for him and in the absence of both the Commodore and Vice-Commodore, then the Rear Commodore acts as Commodore.

In the June Issue of MoToR BoatinG this article on Yacht Club Organization will be continued and we will take up various other features which should be included in the constitution along with the by-laws of every well organized club. We will also take up the subject of the duties of the various committees, yachting etiquette, the remaining officers, etc., etc.

Advertising Index will be found on page 134

IMPORTANT ANNOUNCEMENT

The "Gar Jr. Flyer"

A Guaranteed Thirty-Mile Sea-Going Commuter Boat
High Speed - Low Cost - Reliable as a Train

Built By: Gar Wood, of Detroit, Mich. **Exclusive Sales Agents:. COX & STEVENS, New York.**

Prospective purchasers invited to make thorough trial run

WE have for years, studied and developed different types of craft to be used by business men having country places on the water for daily ferry service to and from their places of business. Before the war and prior to the days of burdensome income taxes, the most popular type for this purpose was the oil-burning turbine yacht of the WINCHESTER type, as developed by us in the two WINCHESTERS and the FLYING FOX; but, since the war, tax burdens, the higher cost of living and the increased cost of operating and building boats of this type have made it necessary to seek a substitute, and we have found it.

The prime requisites for a successful express waterferry are:

A sustained speed of approximately thirty statute miles, smooth running, freedom from vibration, sea-worthy qualities for rough weather, and absolute reliability of operation, with moderate first cost and low cost of operation.

Recently we had an opportunity to test thoroughly the new and remarkable type of boat developed by the famous speed enthusiast of Detroit, Gar Wood, holder of almost all the motor boat records, in varying sizes of boats. His boat, the GAR JR. II (illustrated above) combines more nearly than anything we have yet seen the qualities required for a successful commuter boat.

The GAR JR. II has a speed record of 44 miles an hour, which makes it perfectly simple and easy to guarantee a sustained speed of 30 miles an hour.

She has good sea-going qualities: We have ridden in this boat in heavy seas in the open Atlantic Ocean at a speed in excess of 30 miles an hour, with no spray, no vibration, and little or no motion, as the boat with her powerful motors when running is stabilized almost as though equipped with a gyroscope.

These craft are inexpensive to build, compared with any other type of thirty-mile boats; can be operated with three men,—a combined engineer and steersman, steward and deckhand.

The motive plant as installed by Gar Wood, is practically automatic in its operation, absolutely reliable, and the control is perfect. The engineer and steersman, standing on the bridge at the wheel, has the same control of this boat as the chauffeur in a modern motor car. In other words, we are offering to the public a "Water Automobile" with practically the speed of a motor car and with the comfort and freedom from dust, bad and congested roads.

We will furnish with each boat, a trained Engineer; we will also furnish from the builder, a Guarantee as to speed, fuel and oil consumption and handling qualities of the boat.

Here is a 50 ft. motor yacht, that can if required sleep four people for short trips, with a cruising radius of 900 miles, demonstrated speed far in excess of that guaranteed, of sea-going qualities that have enabled the GAR JR. II to make records from Miami to Palm Beach, from Miami to Havana, from Havana to Key West, from Key West to Miami and from Miami to New York, all in the open sea, that have never been equalled by any boat of moderate size and cost.

For price, delivery and further particulars, apply to

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ALLISON LITE is essentially a yacht lighting plant, designed and built by yacht owners especially for marine service.

In this respect it differs materially from practically all other lighting sets on the market, the majority of which are designed and sold principally for farm use.

Its four cylinder motor is not a converted stationary, farm, marine or cycle car engine. This motor was designed exclusively for Allison Lite.

Likewise the generating unit, switch panel and all other parts are an integral part of the Allison Lite design,—not a collection of unrelated units, assembled from various sources.

Allison Lite is more than a good generating set. It is the very finest yacht lighting plant that can be built, as highly developed in design and construction as the Allison Marine Motor.

3 K. W. and 4 K. W., 32 and 110 Volts. Weight of unit 530 lbs. Price complete except batteries, $2000.

Specifications mailed on request.

ALLISON ENGINEERING COMPANY
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Advertising Index will be found on page 134

ALLISON

The Masterpiece of Marine Motor Engineering

YACHTSMEN, marine engineers and boat builders who have inspected the Allison readily admit that it is beyond any marine engine ever built in quality of construction and perfection of detail. Its price of $25,000 is warranted by the cost of production as well as by the results obtained in service.

The infinite care with which this motor was developed is only equalled by the infinite care with which each Allison is built. Three years of conscientious endeavor were expended in its design. The same degree of effort is followed in its reproduction.

The Allison has already demonstrated its suitability for large high speed runabouts, and for motor cruisers up to 120 ft. Twelve cylinder, Vee type, 300 H.P. at 1000 R.P.M., 425 H.P. at 1500 R.P.M. Built to withstand continuous service and full load at maximum speed.

Let us send detailed specifications

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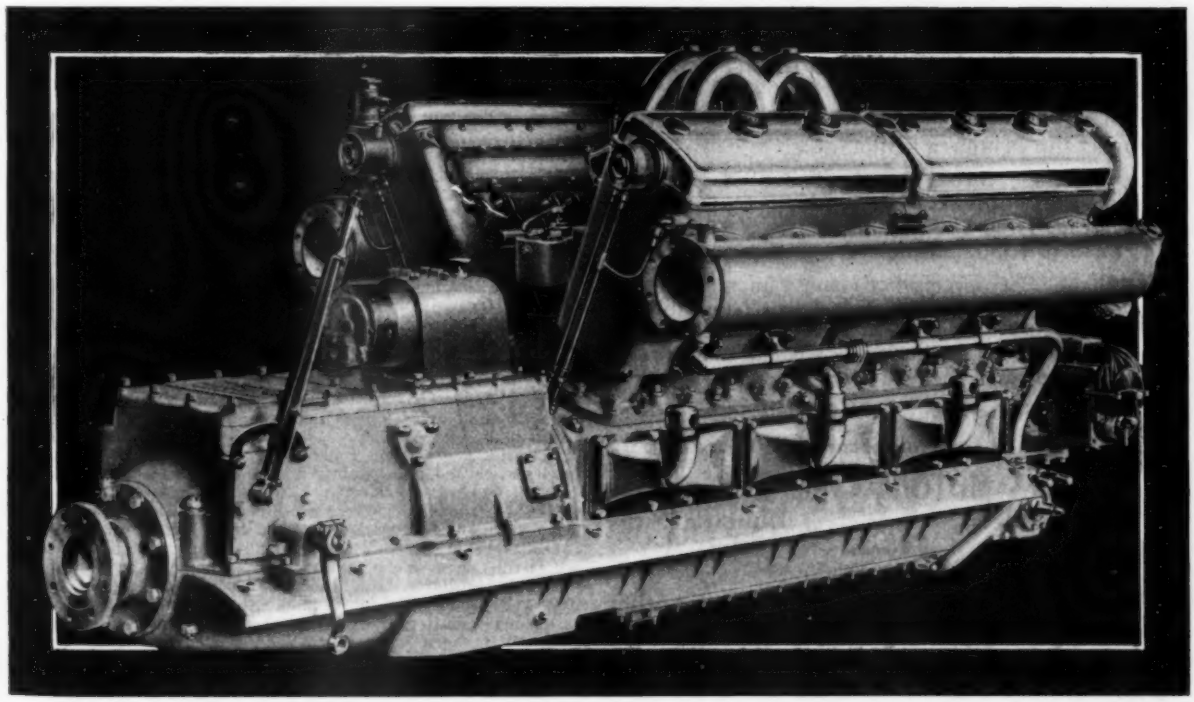

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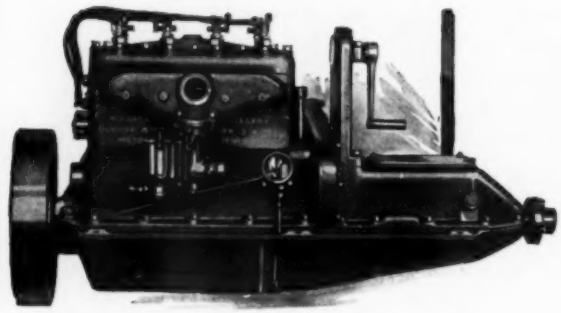


IF you are a good judge of marine motors, you'll find in the Niagara "Special" just what you've been looking for to power your runabout or small cruiser.

A high grade four cylinder four cycle engine that runs like a watch, has the good points of big four cylinder motors, and yet costs no more than any well built single or double cylinder engine of the same power.

Niagara "Special" is suitable for all open boats, speed runabouts, commercial boats, and for cruisers up to 30 or 32 ft. It is a sturdy little engine, built for hard service and constant running.

We have been building good marine motors for years and we have never produced a motor which so quickly found its place in popular favor as the Niagara "Special".

Bore 2⅝" Stroke 4" 4 cylinder 4 cycle
Medium Duty, 600-1100 R. P. M. 5-12 H. P.
Semi-Speed, 1000-1800 R. P. M. 10-15 H. P.
$235 to $330. Complete with Equipment.

You'll like the specifications and equipment of the Niagara "Special" as well as the price. You'll like its economy of fuel, flexibility, easy starting, simple control and inexpensive maintenance. You'll like it because it is a mighty good engine at a very attractive price.

Write to-day for full details

Valuable Agency Territory Available. Write or Wire

NIAGARA MOTORS CORPORATION
206 Niagara Blvd. Dunkirk, N. Y.

New York Representatives
Bruns Kimball & Co., 153 West 15th St., New York, N. Y.

We also manufacture Niagara Motors in other models suitable for all types and sizes of boats. 2, 4, 6 and 8 cyl. 5-14 H.P., 20-35 H.P., 35-60 H.P., 60-120 H.P., 80-180 H.P.

The Why of a Four-Cycle Motor

(*Continued from page 22*)

Figure 29 which is an illustration only a few degrees further in the rotation of the engine shows the beginning of the power stroke. The electric spark has just taken place at the spark plug points and the compressed gas within the combustion chamber has been ignited and is burning rapidly. A high pressure is suddenly built up on the upper surface of the piston forcing it downward and transmitting its effort to the crankshaft by means of the connecting rod. A sufficient amount of this energy is stored in the fly wheel to carry the engine through the remainder of its cycle. The reciprocating motion of the piston is thus transformed into a rotative motion in the crankshaft.

The last stroke in the cycle of four is the exhaust stroke shown in figure 30. The piston is just commencing its upward travel with the exhaust valve wide open. In the previous phase the valves in both the compression and power, strokes have remained closed. The pressure within the cylinder is rapidly reduced due to the discharge of the burned gas through the exhaust valve. The valve remains open from a point slightly before the bottom dead center, until the piston has passed the top dead center. The exhaust gas is driven out throughout this entire stroke and clears the cylinder in preparation for the new charge which begins the entire cycle again from the beginning.

It is apparent that in an engine turning up to several thousand revolutions per minute the time available for opening and closing the valves is very minute. The timing of the valve openings with respect to the piston travel is a very sensitive operation. To accomplish this a camshaft is driven from the main engine shaft by means of a suitable gear so that it rotates at exactly one half the number of turns. The valves are opened at each successive revolution of the camshaft by means of the cams which are an integral part of the forging. They operate a push rod within a guide, figure 28, by means of a hardened roller and the shape of the cam is such as to cause the valve to lift quickly and close again quickly. A very powerful spring is used about the valve to snap it shut almost instantly.

The valve, figure 27, is known as the mushroom or poppet valve pipe. This consists of a head and a stem usually made from one piece of steel. A tapered or beveled edge on the mushroom portion is called the valve seat and is that portion which rests in the cylinder and must be accurately machined to fit a corresponding recess to prevent the loss of gas. As shown in figure 27, there are several types of valves one of which is the cage type and the other is the commoner form. The cage type valve is a special form which permits its removal from the cylinder together with its seat. Any necessary grinding of this form of valve can be done under more comfortable surroundings in a shop rather than while the valve is in the position in the motor. This form of valve also permits of more frequent inspection of their surfaces. It is almost universally used on motors in which the valves are located in the head of the cylinder. Valves of this type are operated by means of an overhead camshaft or rocker arms which operate from above rather than below which is the more conventional way. The one piece type of valve construction is the most popular form in use today. Numerous valves of this type are made with the head and stem of different materials. This construction is called the built up type and the material used is nickel steel or cast iron for the head, while the stem is made of machinery steel. An essential requirement for valve head material is its ability to resist heat. The flow of hot exhaust gas which goes by the valves is very destructive to metal and the materials mentioned are able to resist this heat most effectively. In the case of cast iron heads there is the objection that the joint between the stem and the head may loosen due to the continual pounding of the valve on its seat. A loose head on a valve impedes the action and the operation of the motor will become irregular.

The most generally found type of valve will be one with the domed or arched head, instead of one with a perfectly flat head. It is preferable to omit the slot which is often left in the head to engage a screw driver blade for grinding purposes. Two small holes can be drilled into the valve head and used for grinding by means of a special key. The edges of the screw driver slot have been found to become incandescent under hard service and this has lead to pre-ignition of the mixture.

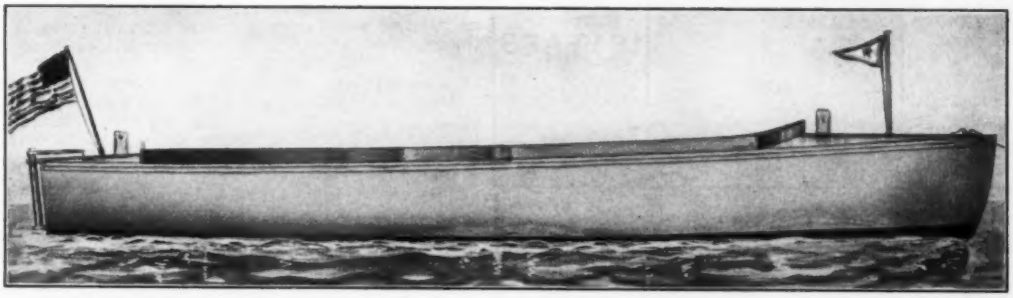
In figure 24 is illustrated a typical form of camshaft. It will also be noted that there are eight cams which indicate that this particular camshaft belongs to a four-cylinder motor of the L-head type in which both the intake and the exhaust valves are on the same side of the cylinder. In the T-head type two separate camshafts with four cams on each are necessary. Figure 21 shows the intake and exhaust cams gears as well as the main shaft gear of a typical T-head motor. The timing gear will be seen to be twice the diameter of the main shaft driving gear.

Figure 22 illustrates several different types of cam profiles.

(*Continued on page 76*)

Advertising Index will be found on page 134

26 Ft. Shallow-Draft Motor Boat
with INDESTRUCTIBLE STEEL HULL



26' x 6'6" x 11" Draft Galvanized Sheet Steel Hull

Here is the ideal shoal-draft motor boat for pleasure or commercial use on rivers, bays, canals, lakes and coastwise waters. Staunch and sturdy for heavy duty work,—practically indestructible under conditions that would wreck an ordinary boat,—stiff and seaworthy enough to ride the waves like a cork,—you'll find this boat suited for every kind of ordinary or extraordinary service.

This is a full tunnel boat with the propeller protected from damage because it operates wholly within the tunnel. Two heavy oak skids running lengthwise on the bottom protect the hull in passing over sunken logs, rocks, sand bars, or when run ashore.

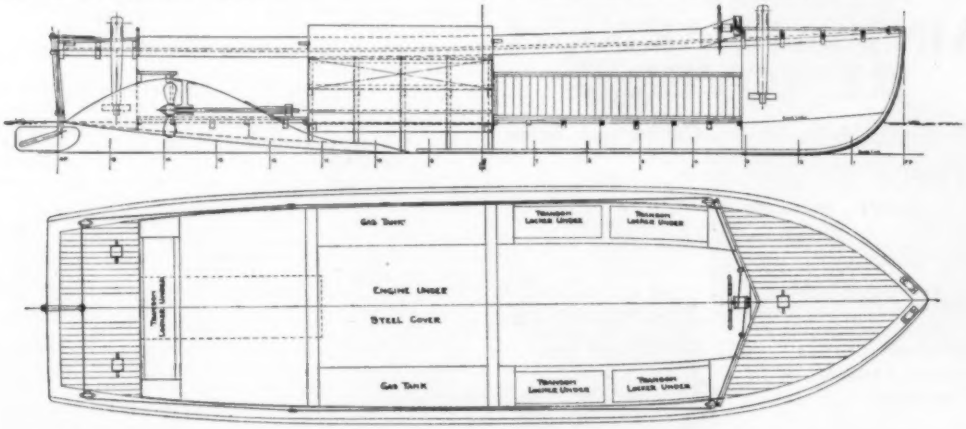
Four watertight bulkheads of galvanized steel divide the hull, two of which act as collision bulkheads, the other two forming a watertight and fireproof engine compartment amidships. Engine compartment is covered with hinged steel hood.

Forward cockpit measures 6 ft. x 7 ft. and aft cockpit 6 ft. x 5 ft., easily accommodating 12 to 14 passengers. Deck, combing and all other woodwork are best selected material.

The motor equipment is a 10-12 H.P. Palmer Model N-R2, bedded on two longitudinals and four transverse steel girders, with reverse gear, bronze shaft and bronze propeller. Any other engine can be supplied by special arrangement.

This boat is built by one of the strongest boat-building organizations in the business. Thirty boats of similar design were built for a foreign government during the war, as well as hundreds of life boats and other craft.

Write today for full details and prices. Standardized production in a fully equipped plant has reduced the cost to an attractive figure.

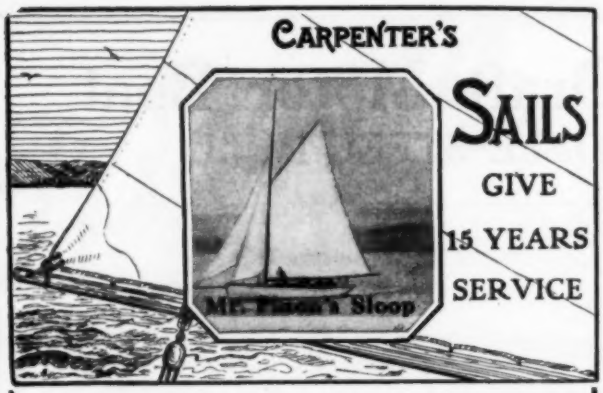


AMERICAN BALSA COMPANY, Inc.
WELIN MARINE DEPARTMENT

Motor Boats, Balsa Aquaplanes and Water Sport Buoyants

PHONE: HUNTERS POINT 3781

305 Vernon Avenue Long Island City, New York, N. Y.



and are still in tip top condition.

So says Mr. Louis A. Pinon of Ribadeo, Spain. See his interesting article on "Yachting in Spain" in the January 1922 number of "RUDDER".

From all parts of the world we have received letters commending the fit and workmanship of Carpenter Sails.

For 80 years our aim has been to make the best sails regardless of all other considerations.

Send us sail plans or information about your boat and we will quote an attractive price.

GEO·B·CARPENTER & CO.

MARINE SUPPLIES

Sailmakers and Riggers

200 W. Austin Av. Chicago

Your friend
PHENOID
TRADE MARK

The Original and Standard for over 20 Years

MARINE

PAINT and VARNISH REMOVER

For Stripping Hulls, Decks, Cabins and Spars

SUCCEEDS when other methods fail.

HARMLESS to wood or metal or subsequent coats of paint or varnish, or to the worker.

Leaves clean, smooth surface for refinishing.

Ask your dealer for MARINE PHENOID or consult us as to how to make quick work of an otherwise tedious, laborious job.

CHALMERS CHEMICAL CO.

123 Chestnut St., Newark, N. J.

We Discover Solomon's Island

(*Continued from page* 13)

voice indulging in song—tuneless as ever, but cheery—when somebody said,

"'Scuse me, Miss, but would yu' like a nice cheeken?"

Startled, I looked up to find three heads peering at me over the side of C. D. B. One of them, as bald as a black billiard ball, belonged to a whiskered old darky—he might have been seventy or a hundred and ten. He was sitting in the stern of a rowboat as old as himself; when I rose he stood up, took off his hat, and waved grandly toward the two urchins in the middle thwart, each clinging to an oar about five times as big as himself.

"Mah gran'sons, Ma'am," he announced.

The captain appeared, and although I felt that I could never equal the grandeur of that "Mah gran'sons, Ma'am," I ventured to introduce him. We became the possessors of the cheeken and a dozen fraish aigs, with the promise of "a dozen mo' soon's I kin git 'em."

They departed, but I scrubbed no more that morning. Numerous coloured gentlemen approached, in skipjacks, sailing canoes, rowboats, anything that would float. They offered feesh, green co'n, 'maters, watahmelon—gran'est melons on the Bay, Miss—and by noon we had fresh food enough for a navy. Two boys sailed up in what looked like a large horse trough, with a faded purple sail which, from various seams and tucks the trained female eye could perceive had once been somebody's petticoat. The big boy lolled astern, steering, the sheet between his teeth; the little one struggled valiantly to hold the mast up. They were the distributors of the sof' crabs, and they arrived daily, always in the same position,—big boy astern, little boy at the mast, the only variation being that when they came up alongside us out of the wind, the sail frequently fell on the little boy and tried to convert itself back into a petticoat.

We were so encouraged by the ease of that morning's plunder that we settled right down where we were and stayed there three weeks. At Solomon's the babies learn to row before they learn to walk—they have to, if they want to get anywhere, for the island itself covers only about one square mile. It connects up with Maryland by what is known as the new bridge, since the building of which, about eighteen years ago, they have stopped calling Solomon's an island, insisting that it is a legitimate piece of Maryland proper.

Most of the inhabitants have farms on the mainland, or they work in the boatyards—at any rate, some business or other urges the entire population, in shirtsleeves and floppy straw hats, to row over to land and back morning and evening. All these rowers passed within a few yards of C. D. B., and when we heard that orchestra of creaking oars strike up, we would take our places on deck and sit there like Mr. and Mrs. Admiral reviewing the fleet. But no admiral ever reviewed such a genial fleet as this one. Black and white, old and young, male and female, the Solomon Islanders are the most sociably minded people in the western hemisphere. C. D. B. had so many callers she took on quite a society air; the Captain suggested that if we ever expected to get the boat painted and the mast scraped, we had better fix an afternoon "at home" and send out cards.

One time over at St. Michaels on the Eastern Shore an old skipjack captain confided to us what he called the soundest motto in the south. "Nevah," he said, "nevah stan' up when y'u kin set down, an' nevah set down when y'u kin lay down."

The Solomon's version of this wise saying seems to be,

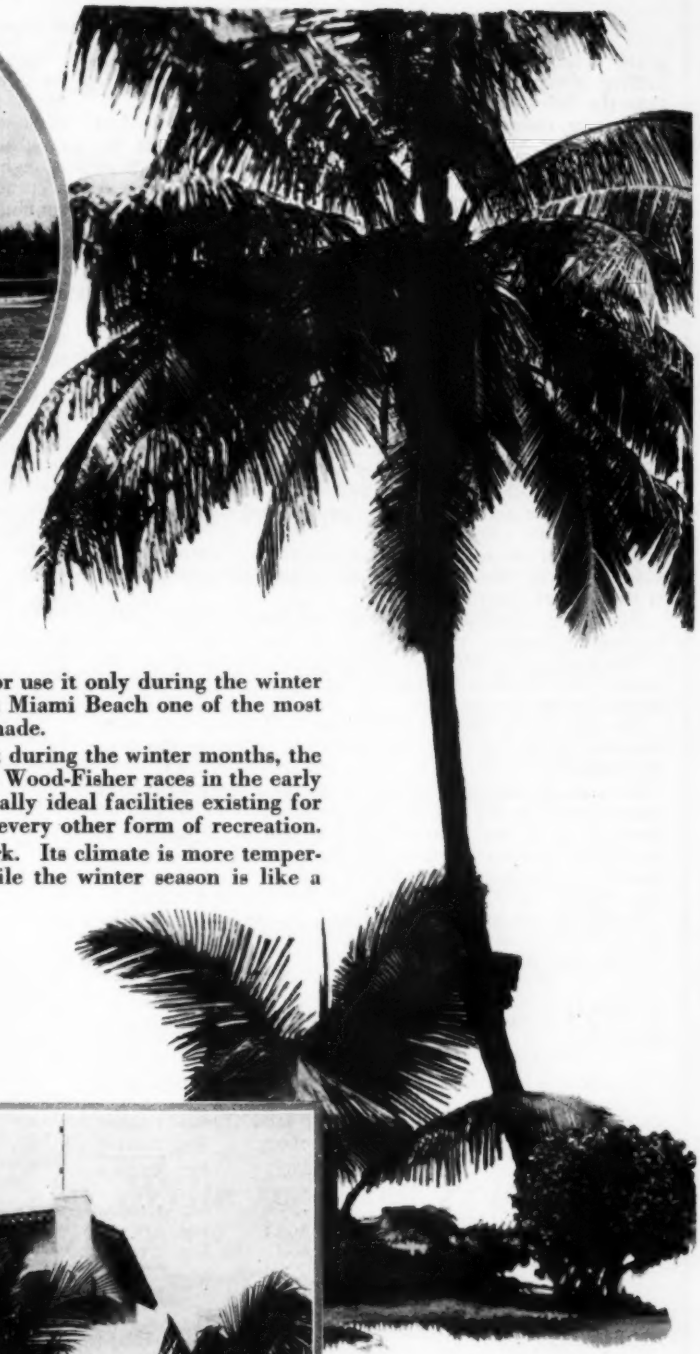
"Never walk when you can row, and never row when you can get somebody else to row for you."

If you are a prominent business man, you sit in the stern of your boat with the junior member of the firm, while a black man toils at the oars. You and the junior member wear your high-crowned straw hats strictly on the middle of your head—tilted, perhaps, a little forward, but never at the rakish angle assumed by your rower—and your suspender clasps glisten in the sun. Below Annapolis the belt, I believe, is unknown. In the morning you and the junior member converse briskly about business; in the evening, on the return trip, you sit back, smoke your pipe, with the straw hat on your knees. If you are not a prominent business man, and have no darky to row you, you engage the services of your small brother, or your small sister—or anybody over four years old who has an arm to scull with.

Late every afternoon, when the rowers had passed by, we would take our quart pail, climb into the flivver and ride over to the mainland for our milk. The flivver is that same garvey, twelve feet by three, which as I proudly related to MoToR BoatinG readers last April, the Captain built in New Jersey at the outset of our 1921 cruise. Until last June we always spoke of her respectfully as the garvey, but last June we hung an Evinrude on her stern and completely changed her appearance. She is very light, and very stiff, and when the Captain cranked her up she would perk her nose in the air and start off with a rush and keep on with a determined rattle that simply

(*Continued on page* 70)

Advertising Index will be found on page 134



Build 'a Home at Miami Beach

WHETHER you live in it the year around or use it only during the winter season, you'll find a permanent home at Miami Beach one of the most satisfactory investments you have ever made.

Miami Beach is the center of boating interest during the winter months, the scene of the Fisher-Allison Trophy Races and the Wood-Fisher races in the early spring. But boating is not the only interest, equally ideal facilities existing for polo, tennis, golf, fishing, bathing, motoring and every other form of recreation.

Miami Beach is only 36 hours from New York. Its climate is more temperate than New York in the summer months, while the winter season is like a Northern June.

Write for booklets and complete information about restricted property available.

CARL G. FISHER

MIAMI BEACH, FLORIDA

Short Cuts in Figuring

(*Continued from page 32*)

erally it is sufficient to take the nearest mantissa, see what antilog. it represents, and point off from the left one more than the index, and that is all there is to it.

Squares, cubes and roots. It is very easy indeed to find them by logs. The square is the product of multiplying the number by itself. We multiply by adding the logs. So if the log. of a number is multiplied by 2 (which is the same as taking it twice and adding) we get the log. of the square of the number. Or multiplying by 3 gives the log. of the cube. So to extract the square or cube roots of a number, simply pick out its log. and divide it by 2 or 3, and you have at once the log. of the root. Any powers or roots can be found in the same manner.

SUMMARY OF RULES

To multiply. Add the logs. of the numbers to be multiplied. Their sum is the log. of the product.

To divide. Subtract the log. of the divisor from the log. of the dividend. The remainder is the log. of the quotient.

To square, cube, or find any power of a number, multiply its log. by the exponent of the power, and the product is the log. of the power.

To extract the square, cube or any root of a number, divide its log. by the exponent of the power, and the quotient is the log. of the root.

Every log. consists of an index or characteristic and a mantissa.

The index of a whole or mixed number is positive, and always one *less* than the number of digits to the left of the decimal point.

The index of a decimal is negative, and always one *more* than the number of ciphers immediately following the decimal point.

To find the mantissa. Opposite the first three figures of your number, in the first or "No." column of Table 42, find the mantissa in the column headed by the fourth figure. If the number has but 3 figures, find the mantissa in the column headed 0. For numbers under 100, find the complete log. on page 755.

In finding the mantissa, disregard the decimal point; but heed it in setting down the index.

Examples for practice:

Multiply:	Solution:	
368 x 2700	368	log. 2.56585
	2,700	log. 3.43136
	993,600	log. 5.99721
34.29 x 160.3	34.29	log. 1.53517
	160.3	log. 2.20493
	5,497	log. 3.74010
25.6 x 399.1 x 3,628	25.6	log. 1.40824
	399.1	log. 2.60108
	3,628	log. 3.55967
	37,070,000	log. 7.56899
Divide:		
7,634 by 377	7,634	log. 3.88275
	377	log. 2.57634
	20.25	log. 1.30641
123.4 by 6,398	123.4	log. 2.09132
	6,398	log. 3.80604
	.01929	log. $\bar{2}$.28528
Find the cube of 424.3	424.3	log. 2.62767
		3
	76,385,000	log. 7.88301
Find the square root of 6,982	6,982	log. 2)3.84398
	83.56	log. 1.92199

Accuracy of logarithms. The Bowditch log. table is a so-called five place table. That is, the mantissae are figured out to five decimal places. With such a table any ordinary distances, such as the navigator has to deal with, will be accurate to the nearest 1-10th of a mile; and this is close enough. It is not to be expected, however, that precise accuracy can be obtained with such a table, in computations running into very large numbers.

Logarithmic functions of angles. In the previous lesson, some of the functions of angles were explained. The sine, cosine and tangent, were shown to be numbers (in fact decimals, except that tangents are sometimes mixed numbers), which numbers express the proportion between various sides of right triangles. These numbers were called the natural functions, and in Table 41, were found the natural sines and cosines.

We also saw that triangles could be solved by multiplying or dividing certain sides by certain natural functions. Or the function of certain angles could be obtained by the division of certain sides by other sides. In other words, the solutions were all by multiplication or division; and it must have been found, in the few examples given for practice, that the processes were tediously long. Here logs. come to the rescue.

The sides of plane triangles are expressed in linear measure. For instance, the hypothenuse or distance may be 175 miles. This plainly can be expressed as a log. But the natural functions are also numbers, which may be expressed as logs. By using logs. the tedious processes of multiplication and division by natural functions may be reduced to a mere adding or subtracting of logs.

Take a problem. A ship sails N 35° E, Dist 362.4 miles. Find the Dep. Our formula is: Dist × sin Course = Dep. Looking in Table 41 (p. 753) we find natural sin 35° to be .57358. Multiplying this by the Dist (362.4) gives the Dep 207.9 miles. But in solving the problem by arithmetic, we set down some 42 figures, in seven different rows. Suppose we do it by logs.:

Dist (362.4)	log.	2.55919
sin C 35° (.57358)	log.	$\bar{1}$.75859
Dep (207.9)	log.	2.31778

(Note: The logs. of the Dist. and sin C are added, giving the log. of the Dep. Then the antilog., 207.9 is found and written in. The answer is placed at the left, instead of at the right of the log. answer, because this form of arrangement is found convenient, and is generally adopted in trigonometrical solutions.)

Above we have used 18 figures. Still, perhaps little or nothing would be saved if we had each time to take out the natural function from Table 41, and then turn it into a log. by Table 42. But that is unnecessary, for the log. functions have all been computed, and appear in Table 44. It should be understood, however, that these log. functions are nothing but the natural functions turned into logs. Going into Table 44, with 35° (p. 807) at the top of the column headed Sine, we at once find the log. sin. of 35°, which is 9.75859. This is precisely what we had above, except that the index is given as 9 instead of —1. A word of explanation about the indices appearing throughout Table 44 is necessary. Natural sine .57358 is a decimal, and by the rule given above the index should be —1, and the log. $\bar{1}$.75859. Instead, in Table 44, it is 9.75859. This is because, throughout Table 44, for reasons of convenience in use, 10 has been added to the indices of all the logs. You will see that:

$$\begin{array}{r} \bar{1}.75859 \\ +10. \\ \hline +\ 9.75859 \end{array}$$

By adding 10 in this fashion, the bothersome minus signs are dispensed with. So it is unnecessary to go into an explanation of addition and subtraction of negative quantities for we shall not have occasion to use them. But remember

(*Continued on page 98*)

Light Your Boat with the Holt Power-Light

It Delivers Standard 110-Volt Current Direct from the Generator. No Storage Batteries in the Lighting Circuit

HERE is the most compact lighting unit ever devised—30½ inches long at the base and only 45 inches high with water cooler as shown in the picture.

For boat use the Holt Power-Light is furnished with regular water-cooling system as shown or with a water pump, as desired.

The three-quarter K-W model, shown above, will operate thirty 25-watt lamps. It will furnish current for a 600-watt two-plate electric stove with fireless cooker, or for a powerful searchlight. Cabin light can be taken off 6-volt starting battery when machine is not running.

Turning a switch starts it. Its operating speed is automatically regulated to the load by the special patented Holt Solenoid Governor.

Saves Gasoline—saves current. Operates with standard electric lights and appliances.

Weighs only 390 pounds—and because of its light weight and compactness the Holt Power-Light is especially desirable for Boat use.

Write for Free Folder

Tear off a corner of this sheet, write your name and address and we will send you free, two-color folder describing the Holt Power-Light in detail, and giving its many points of superiority.

Holt Power-Light Co.

Detroit, Michigan

"Power Saved is Power Gained"

With apologies to Ben Franklin

A Blood Bros. Universal Joint saves power in any hull.

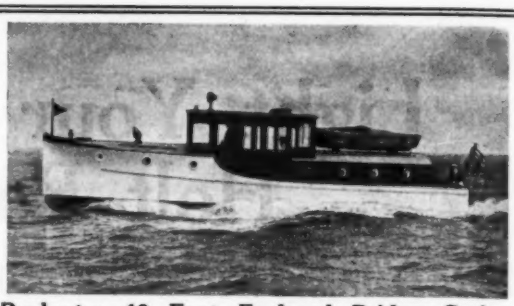
A rigid shaft installation is certain to be out of alignment most of the time while under way because every hull bends and weaves more or less when riding the waves. A good joint should be used on all straight line drives as well as for angular drives.

Sturdy, Strong, Compact, Durable

Big bearings. Simple lubrication. Won't throw oil. Four sizes. Write today for Marine Bulletin and prices.

BLOOD BROTHERS MACHINE CO., Allegan, Mich.

Western Representative, F. SOMERS PETERSON, San Francisco, Calif.



Rochester 40 Foot Enclosed Bridge Cruiser

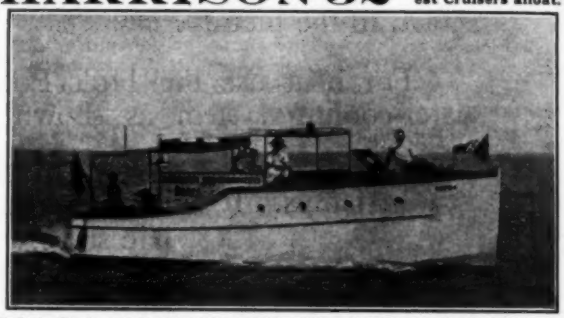
Spring delivery on enclosed bridge 40 footers. Write for information on this or 45, 50 and 55 foot cruisers.

ROCHESTER BOAT WORKS, INC.

10 Charlotte Sta. Rochester, N. Y.

HARRISON 32

"One of the finest Cruisers afloat."



Built in Single and Double Cabin models. Motor 40 H.P. Speed 12 M.P.H. The price of $4950.00 guaranteed to July 1st, 1923. Illustrated literature sent on request.

Established 1897

R. W. HARRISON BOAT WORKS

Bay View Park, Toledo, Ohio

WE SHIP THE DAY WE RECEIVE YOUR ORDER

Save Two Thirds Cost—By Building Your Own Boat

OUR PRICES ARE LOWER

BROOKS—OLDEST established BOAT BUILDERS

BROOKS KNOCKED-DOWN OUTFITS make Boat Building a pleasure. You can easily build a boat in your spare moments this winter. Quick and perfect results can be obtained by using this simple method. BROOKS MATERIALS are all especially selected and of highest quality.

Let us furnish you with plans or KNOCKED-DOWN OUTFIT or build you a COMPLETED BROOKS BOAT. Our models are of the latest designs, handsome, staunch and seaworthy.

Send 10c for BIG descriptive catalog, full of general information for prospective Boat buyers.

BROOKS MANUFACTURING COMPANY

2423 Brooks St., Saginaw, Mich.

Pioneer Specialists in Marine Sanitary Fixtures

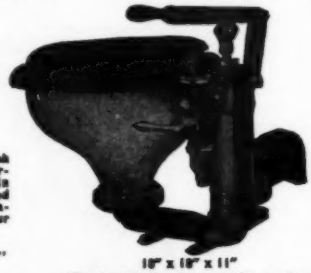
Since our advertisement appeared in the first issue of MoToR BoatinG, December, 1907, hundreds of Curtiss fixtures have been installed in motor cruisers and yachts of all sizes, including some of the finest boats launched within this period.

The Curtiss line is exceptionally complete, varied in type, size and price to meet every possible requirement. Each model has been designed in accordance with our wide experience in boat work and can be depended upon in quality, service and durability no matter whether it is our highest or lowest priced model.

"PRICES ON APPLICATION"

THE J. H. CURTISS CO.

2 South Street, New York



18" x 18" x 11"

The best little closet on the market today, possessing many of the advantages of the large size toilet. All brass and porcelain. Oak seat and cover.

YOU GET SPEED with your portable motor when you attach it to a square-stern "Old Town Canoe." The "Old Town" construction combines great strength with exceptional lightness in the square-stern. It never needs caulking—it will last for years.

The 1922 catalog shows all "Old Town" models in colors. Write for one today. Free.

OLD TOWN CANOE CO.

285 Middle St., Old Town, Maine, U. S. A.

More Speed Guaranteed

Let us increase your boat speed with a

B & B Propeller

We are so sure that the celebrated B & B Propeller will make your boat go faster that we positively guarantee it to increase your speed from **one to three miles per hour.**

Excellent materials and workmanship together with scientific design is the reason for the wonderful efficiency of B & B Propellers. They are different.

Any size and pitch up to 30" dia. in stock.

Write Today for Catalog

BRYANT & BERRY PROPELLER CO.,

1202 Lillibridge St., Detroit, Mich.

New York Representatives: E. J. Willis Co., 15 Chambers St., N. Y. C.

Canadian Sales Agents: Canadian Fairbanks Morse Co.

Advertising Index will be found on page 134

Helpful Hints for the Boatman

How to Box the Compass, How to Mark a Lead Line, How to Pack a Stuffing Box; this is the sort of practical information contained in "Sea Craft Suggestions and Supplies." Also describes and tells the uses of the complete line of WC Dependable Marine Hardware for motor boats and other small craft. Nearly 300 pages, strongly bound in full cloth. Fifty cents (coin or stamps) puts it in your cabin for ready reference.

WC Flange Couplings

One of the 1,001 *WC* Products

Accurately made, and interchangeable as to shaft size within the limits of each size of coupling. Regular Couplings suitable for most marine engines. Heavy Couplings for fishing boats and other work boats having heavy duty engines, and where great strength is desirable. Each coupling fitted with standard key way and set screws.

Wilcox, Crittenden & Co., Inc., 4 So. Main St., Middletown, Conn.
Established 1847

Peerless

"The Engine that Makes Good"

After five years' service—
"They are the best motors ever made, regardless of price"
(It takes a mighty good engine to please a man day after day for five years)

HORATIO L. HALL
4633 MAGNOLIA AVENUE
CHICAGO

Feb. 28, 1921.

Peerless Marine Motor Co.,
2160 Niagara Street,
Buffalo, N.Y.

Gentlemen:

You will recall the two 25-35 H.P. Peerless Motors you furnished me five years ago.

These motors are running as nicely to-day as ever, and there has never been a broken part. They are the best motors ever made regardless of price.

Herewith enclosed are photos of my boat equipped with the engines as mentioned above. I get ten miles an hour at 800 revolutions. As you know the boat is 46' X 13' 3". The water, gasoline, ballast and supplies weigh approximately 10,000 lbs.

Yours truly,

H. L. Hall

Peerless Four-Cylinder
25-35 H. P.

PEERLESS Marine Motors give the kind of service that makes boating a real pleasure or a profitable occupation, according to the type of boat you own. These motors have proved it isn't necessary to pay a fancy price to get a satisfactory power plant.

Peerless motors from 5 to 50 H.P. for medium and heavy duty, are suited to all types of boats. You will find them in classy runabouts, in big cruisers and hard working fish boats.

Let us tell you the size, power, dimensions and price of the Peerless most suitable for your boat.

Write today for latest catalog, giving dimensions and details of your boat.

Peerless Marine Motor Corp., **2160 Niagara Street BUFFALO, N. Y.**

MORE POWER-GREATER SPEED-

Nothing will contribute more toward making a real summer than a speedy, vibrationless Koban. Attached in a few minutes to any rowboat, it gives you a fast power boat.

Does Not Shake the Boat

The Great 2-CYLINDER KOBAN ROWBOAT MOTOR

The Koban gives you more power and greater speed than any other rowboat motor because it has two cylinders. It does not shake the boat. Only by this 2-cylinder opposed construction can you avoid the continual vibration that makes riding unpleasant, opens seams and ruins rowboats. Special tilting device, for shallow water and beaching.

Write for catalog and full information

Dealers and agents write for our profit-making proposition

The first 2-cylinder rowboat motor—the standard of its type—not an experiment.

Koban Manufacturing Co. 246 South Water St. MILWAUKEE, WIS., U. S. A.

"The CAPITOL"

MARINE UNIT POWER PLANT

COMPLETELY ENCLOSED — COMPLETELY EQUIPPED

If you own or are planning the kind of a runabout or cruiser that deserves a really excellent power plant, you should know more about the Capitol.

There isn't a smoother, quieter running marine engine. Vibration and noise are eliminated by perfect balance, wide-faced helical-cut timing gears, force feed lubrication, ball bearing universal joint, three point suspension, and many other improvements.

Delco ignition, Atwater-Kent two-unit starting, lighting and generating system, Willard storage battery, Stromberg or Schebler carburetor, instrument plate and all other necessary equipments of highest grade.

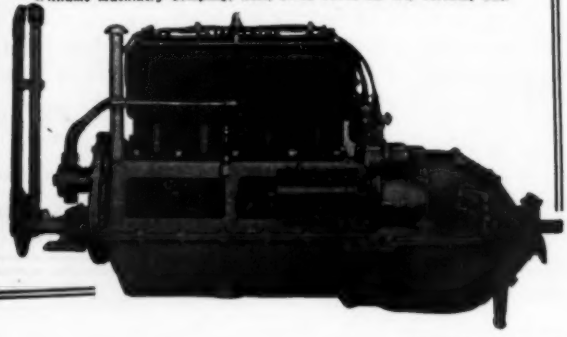
Bore 4¼" Stroke 5½"

High Speed Model 60-65 H. P. at 2000 R. P. M.
Medium Speed Model 30-34 H. P. at 1000 R. P. M.

Write today for complete description and prices

AUTO ENGINE WORKS, St. Paul, Minn., U. S. A.

Eastern Representatives: Ventnor Boat Works, Atlantic City, N. J.; Fred C. Duclon, Alexandria Bay, Jefferson Co., N. Y.; Gray-Aldrich Company, Inc., 84 Atlantic Ave., Boston, Mass. Canada: The A. R. Williams Machinery Company, Ltd., 64-66 Front St. W., Toronto, Ont.



We Discover Solomon's Island

(*Continued from page 64*)

forced the word flivver to the lips. The islanders regarded our excursions in the flivver as a piece of the wildest folly. When we landed at the wharf they would gather around to ask a thousand questions about the Evinrude, but an invitation to go for a ride always brought a chorus of negation.

"No *Suh*, no thank y'u, *Ma'am;* I'se raised on the watah, but when I goes rowin' I prefuh to set in somethin' a little moh chunky!"

If anyone wanted, I think they could live all summer in Solomon's harbor without once setting foot on land. Gasoline, ice, and fresh water are available at the wharf. The inhabitants are justly proud of the purity of their spring water; they vow that it will cure anything, from rheumatism to nerves. Every Monday morning, heralded by a great chattering and giggling, my friend Laura and three others just like her, appeared in a row boat, took my wash and vanished until the following Wednesday, when our rough cruising clothes were returned, faultlessly laundered, with that about them which suggested that they had been spread to dry upon some sunny patch of clover.

If you ever want any canvas work done, take it to Solomon's and ask for Mr. Olson. For fifty years Olson has made sails for Chesapeake captains, and every one sewed by hand. We wanted a little piece of canvas to steady us with the breeze abeam, so the captain drew a picture of what we had planned and took it up the hill to where Mr. Olson sat in his shop.

"H'm," said that gentleman, rather scornfully; "forestays'l. 'Taint much of a sail."

But he brought it down next morning, and it was a work of art, every seam as straight, and every stitch as even as a piece of Chinese embroidery. I confess that I had suspected the Captain of ordering the sail solely for the pleasure of hearing the old time flap of canvas—until two years ago we were sailboat people—but that sail proved its worth in taking the edge off many a sidewise roll, and in the Chesapeake the waves rise quick and high.

We kept a sketchy apology for a log while at Solomon's, and one sentence reads:

"Thursday morning early we sailed down to Davis' yard to repair a leak."

Only thirteen words, but those thirteen words contain the story of the weirdest sail I ever took in my life. It was the day after we had bought the new sail; the log says "early Thursday morning," but when the Captain woke me it was around what the soldiers in France called the zero hour.

"Feel that breeze!" said the Captain excitedly. "Get up, Kate, I'm going to sail you down the Creek—no engine at all. We'll sail right into the yard as easy as coasting downhill. I want to start early so if anything goes wrong nobody'll see us."

We started off with a grand rush that nearly caused a collision with a pungy anchored just below, but when the first puff eased up we fell off and began to skid. We had only a quarter of a mile to go, but our route lay through a flock of small schooners—difficult enough to dodge even with the engine. In vain I implored the Captain to start the motor, reminding him that this was a motor boat, it wasn't intended to go all by itself; what he replied would not bear repeating, its essence was that we had acquired a perfectly good sail and now we were going to use it. It took us just two hours to make that quarter mile. We used no engine and no oars and by some miracle we bumped into nobody, but we slid and wobbled and circled and did everything but turn somersaults. If ever there was a drunken ship, it was C. D. B. that morning.

We were slated to go up on the ways at seven, but when we got there they had forgotten all about us, and we watched three schooners and a pungy, painted an alluring pink, go up ahead of us. Davis, a magnificent figure in the floppy straw hat and suspender uniform, stood above the ways and shouted his orders. He had a voice like Billy Sunday's trombone man; it roared above the donkey engine, and the schooner captains hastened to his bidding. When the pink pungy started up there was a hitch somewhere—we learned afterward that Davis had got a spike stuck in his bilge block, and all the king's horses, etc., couldn't get it out again. The pungy captain was a quiet efficient little man, who had not spoken a word the entire morning. To Davis's roared commands he replied with a nod or a wave of the hand; he had two women aboard and a baby, and the professor said he was silent because he was henpecked. Immediately I rose to his defense and said that I was sure he could outyell fifty Davises if he only wanted to. Just then Davis shouted to the pungy to come ahead. The little captain made all the motions that go with human speech, but no sound issued from his lips.

"What?" roared Davis.

"All right," screeched the pungy captain. He had the highest,

(*Continued on page 76*)

Advertising Index will be found on page 134

The Jersey Flyer

18-Foot V-bottom equipped with N.J.M. Special Making 30 Miles Per Hour

Order Early To Get Prompt Delivery

Price Complete, $1625.00. De Luxe Model, Electric Starter, $1750.00

We Also Build 21-Foot Sea Skiffs

NEW JERSEY MOTOR BOAT CO., Keyport, N. J.

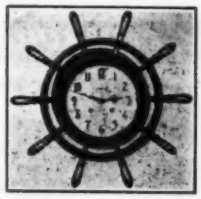
HIGH GRADE MARINE CLOCKS

We specialize in striking and non-striking ship's clocks, chronometers, barometers, etc., and in repairing high grade ship's clocks. Our clocks make splendid Yacht Club prizes.

Unexcelled in accuracy, reliability, workmanship or finish. Clock manufacturers for ninety years.

Write for prices.

Daniel Pratt's Son (Winthrop E. Pratt), 294 Washington St., Boston, Mass.
Established 1832

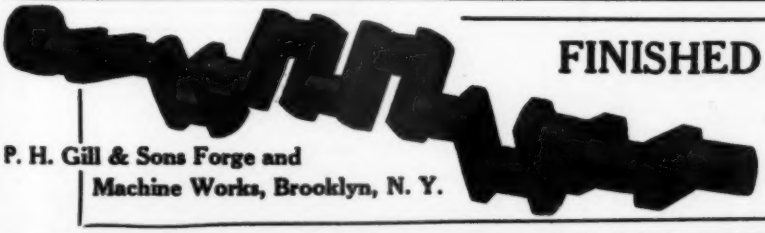


Racing Hydroplanes—Special High Speed Runabouts

75-85-95 AND 100 M. P. H. BEEBEE DESIGN 40-50-60 AND 75 M. P. H.

CLASS RACING BOATS "MOTO-ROW" OUTBOARD BOATS ROW BOATS

SYDNEY C. McLOUTH, MARINE CITY, MICH.



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We are furnishing them to some of the leading marine engine builders. Carbon and Alloy Steel, Heat Treated to your own specifications. We grind all Pins and Bearings. Forged, machined, and finished complete in our own plant. Let us quote you.

P. H. Gill & Sons Forge and Machine Works, Brooklyn, N. Y.

The Barker Motor (Two-Cycle)

"Have run my Barker Motor thirty thousand miles in ten years and it is good for ten years more."—Name on request.

Built for long service—New low prices in effect

The BARKER FACTORY ***Norwalk, Conn.***

Write today for "Red Letter Book" of Motors

In New York: TOPPING BROS., 122 Chambers St. **In Boston: TOPPAN CO., 101 Haverhill St.**

Reliance
Steering and Engine Controls

Inclined Auto Type
Vertical Cruiser Gears
Combined Unit Controls
Watertight Bridge Deck
Reverse Gear Controls
Electric Clutch Controls

Sole Manufacturers of Patented Scored Drum Steering Wheels

A Wheel for Every Type Boat

Write for catalog

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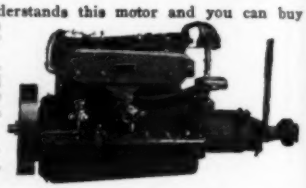
CADYFORD

Lowest Priced 4 Cyl. 4 Cycle 12-16 H. P. Marine Motor on the Market.
Ford Parts Replacements in Stock Everywhere

The finest little marine engine you'll ever care to own. Bore 3¼, Stroke 4". Will pull 16 H.P. all day long, running 800 R.P.M.

Best of all, any garageman understands this motor and you can buy Standard Ford replacement parts quickly and cheaply in any city or town, the world over.

Write today for details, specifications, prices, equipment and name of nearest dealer. We also build 2 cycle motors 1½ to 8 H.P., famous for 25 years.



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Established 1883

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The Safest Little Family Boat Built. Motor Housed In.
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17′ Sail Dory	14′ Outboard Motor
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Successors to Cape Cod Power Dory Co.
Builders of craft to 150′ length, or 10′ draft
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The MOTO-ROW $250

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ELASTIC SEAM COMPOSITION TRADE MARK

Used by the Government and by most Steamship and Yacht Builders and by Amateur Builders.

Write today for catalog of

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A Real, Low-Voltage Searchlight!

THE most powerful searchlight of the incandescent type.

Unlike anything you have ever seen.

Built entirely of brass with our own specially designed heavy glass reflector and bulb.

Furnished in three sizes: 7, 10, and 14 inch for 6, 12, 24, 32 volts.

Finished in Polished Brass, Black, Nickel, and Battleship Gray.

Projects an intense beam of 116,000 to 530,000 Candle Power a distance of One Half to One Mile, depending on size of searchlight and voltage.

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SOUTHLAND STEAMSHIP COMPANY
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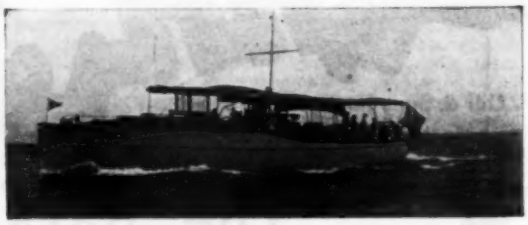
Finest St. Lawrence River Skiffs & Inboard or Outboard Motor Boats

AT RIGHT PRICES

Direct from Builder to User

Catalogue on application to

CRESCENT MOTOR BOAT CO.
Clayton (Thousand Islands) N. Y.



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Sixty standard designs, the product of 20 years' experience, for you to choose from.

New plant of four times former capacity. Our new literature on knock-down boats sent on request.

DEFOE BOAT & MOTOR WORKS
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Advertising Index will be found on page 134

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Quick Delivery on Reliable
MARINE HARDWARE

Every article listed in our net price catalog is fully guaranteed by the manufacturer, and we back it up with our reputation for integrity gained from 25 years of successful business experience.

Cabin Dome Lights

Fitted with small lever switch. Made in both nickel finish and pol. brass. Operated from regular lighting system or storage battery.

Size 3 inches	$2.00
Size 4 inches	2.20
Size 5 inches	2.75

Wilco Steerers

Made in both pol. brass and galv. Unusually strong and heavy.

Size Wheel	Diam. Drum	Galv.	Pol. Brass
12-in.	2½ x 3	$1.95	$2.95
16-in.	2¾ x 3½	2.95	3.95
20-in.	4 x 4½	5.70	9.95

"Light Pattern" Fog Bell

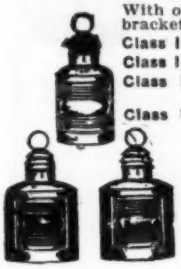
Meets all Government requirements. Made from heavy bell metal; special pol. brass.

Size	P. P. Weight	Cash Price
6-in.	2 lbs. 4 oz.	$1.10
8-in.	4 lbs.	1.95

Wilco Sailing Lights; Class II and III

With original Fresnal lenses; spring fount hinge; bottom and bracket; burns oil, adaptable to electricity.

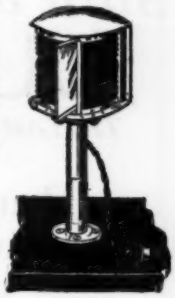
Class II, Galv. each, $1.75, pol. brass, each, $2.35, Bow Lights
Class III, Galv. each, $2.50, pol. brass, each, $3.00, Bow Lights
Class II, Galv. per pair, $3.25, pol. brass, per pair, $4.50, Side Lights.
Class III, Galv. per pair, $5.00, pol. brass, per pair, $6.00, Side Lights.



Little "Giant" Electric Combination Light

Fresnal lenses (red and green), polished brass; complete with 6 volt 4 cp. Mazda bulb; detachable socket for flagpole; run from regular ignition system or on five or six storage batteries.

Light complete..... $7.90
Light complete, less standard 3.95



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ELECTRICITY afloat leads the way in Safety, Reliability, Comfort and Economy, as applied to day cruisers, yachts, house boats and commercial vessels.

William T. Donnelly, Consulting Engineer
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"LIGHTNIN." Smallest electric cruiser afloat. Electricity will give you best power for propulsion, clean heat for cooking, bright light at night and will make yachting a pleasure all the time and everywhere you go.

Equip Your Boat With a
W-W MAGNETIC WHISTLE VALVE

An electrically controlled air valve, made especially for motor boats. For use with any air whistle. Can be installed at whistle or on air tank. 6 volt or any other desired voltage. Sturdily made, all brass. Waterproof, moistureproof, troubleproof. Patent pending. **Simple to install. Supplied with 20 ft. of wire and push button.**

Write today for details and prices.

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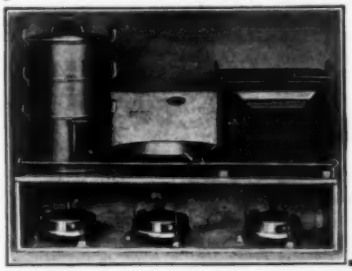
WEBBPERFECTION

Oil Stoves burn common kerosene with a hot blue flame. Convert the fuel into a dry gas which is controlled by a needle point valve. Perfect combustion. No odor. Absolutely safe. Does not affect insurance rate.

Made in one, two and three burner outfits, with steamers, ovens, etc., **that fit.**



We also build high grade yacht ranges for coal or oil fuel. Complete for roasting, baking, boiling, broiling, etc. A favorite for years with leading Naval Architects.

Used on most prominent yachts afloat.

Write today for catalog and prices.

Elisha Webb & Son Co.
136 Front St., South, Philadelphia, Pa.

Built by
LUDERS
The Last Word in Yacht Designing and Building

Luders Marine Construction Company

Stamford, Conn.

Michigan Marine Motor $135
Repairs at any Ford Garage

HIGHLY recommended by builders of famous Belle Isle Bearcat. Unequalled for lightness, compactness, dependability, fuel economy and quick starting. Rarely needs adjustment. Specially designed for tenders, launches and fishing boats. Equipped with genuine Bosch magneto and impulse coupling. Four-hp., 4-cycle, 125 lb. motor fully guaranteed for one year. Special dealer offer.

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Electric Searchlights
ARC OR INCANDESCENT

A Searchlight for any purpose. Arc Searchlights for 110 volts. Incandescent Searchlights for low voltage. In sizes from 7 inch to 60 inch. High efficiency. Moderate price. Special glass mirror. Sturdy cast bronze fittings.

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BOATS BEAUTIFUL

50 Ft. of Cruising Comfort in a 36 Ft. Boat

LARGE bridge deck, fore and aft cabins, well-equipped galley; an engine room with two bunks and workbench, two toilets, every detail correct. Immediate deliveries from stock.

Write for illustrated book with photographs, specifications and price. We also build a 26 foot Runabout, designed by John L. Hacker. Speed 25 miles. Write for details and price.

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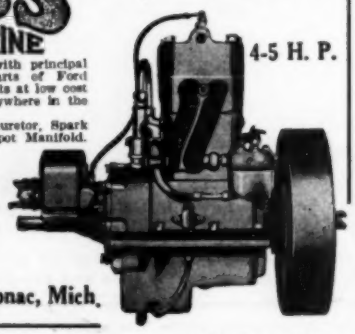
THE HESS MONO-MARINE
$130.50
4-5 H. P.

A small engine of quality, with principal parts interchangeable with parts of Ford motor. Repairs and replacements at low cost in any Ford service station, anywhere in the world.

Price includes Kingston Carburetor, Spark Plug, Coil, Switch and Hot Spot Manifold. With Bosch High Tension Waterproof Magneto, $150.00. Bronze shafting, flange couplings, stuffing box, stern-bearing and propeller, $35.50 extra. Same with List One-Way Clutch, $30.00 extra. Same with reverse gear, $85.00 extra.



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Advertising Index will be found on page 134

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Designers and Builders of

EXPRESS CRUISERS

TRENTON MICHIGAN

YACHTS -- CRUISERS -- HOUSE BOATS

Experience Teaches—Hence the reason that once an owner of a New York Yacht Launch and Engine Craft always an owner. Many years' experience in high class Yacht Design and Construction are at your service.

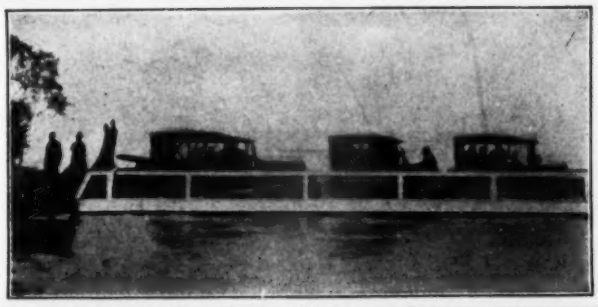
20th CENTURY MOTORS

400 to 500 R. P. M.
Heavy Duty Type
Four cycle. Bore 6½",
Stroke 8"

2 cyl. 15-20 B. H. P.
4 cyl. 40-50 B. H. P.
6 cyl. 65-75 B. H. P.

NEW YORK YACHT LAUNCH & ENGINE CO., Morris Heights, New York City

THE JOHNSON MARINE REVERSE GEAR



ON a heavy duty 50-ft. x 20-ft. Ferry Boat in service for over 5 years, making 100 round trips per day, carrying 3 to 6 autos to a load. A distance of a half mile on Wisconsin river.

Mr. Wells says: "The No. 3 gear is giving me good satisfaction and I think stands up well considering the work it has to do—at one landing we head in and back out—on opposite landing we back in and head out."

This is the kind of service Johnson ball bearing gears give.

What more proof is needed?

Write department 20 for our catalog.

Cut courtesy T. S. Wells, Merrimac River Ferry, Merrimac, Wis.

Write for our catalog No. 25.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN

BLACK & WHITE
VALVE GRINDING COMPOUND

The Fastest Cutting Compound on the Market.

You will find BLACK & WHITE the most satisfactory compound you have ever used. It is composed of several grades of abrasives and a superior grade of petroleum jelly.

BLACK & WHITE is the result of fourteen months' experimentation and we have a compound that cuts and polishes the valves and valve seats instead of tearing the fabric of the steel.

BLACK & WHITE puts a smooth finish on the valve and seat, takes out pits, carbon spots and never leaves rings or ridges on the valve seats.

You will save money by using BLACK & WHITE because you will cut the time and labor cost in two, and above all, you will save nearly half your gas—all that is wasted by leaky valves.

If your own dealer does not sell BLACK & WHITE, send us his name with fifty cents for a 5-oz. double can containing coarse and fine mixture.

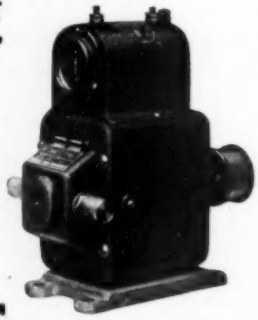
Do this today.

A certain amount of territory still is open for distribution.

ABRASIVE SALES CORP.
11 East 45th Street, New York, N. Y.

Plenty of Light
Plenty of "Juice"

HAVE all the light you want without fear of running your batteries down. Equip your boat to generate its own electric supply so you will always have plenty of "juice". Install a



COMET
BOAT LIGHTING PLANT

Comet Generators are built in eight sizes to meet every requirement from the small cruiser to the largest yacht. They have ball bearings, automatic cut-outs and are built to stand heavy overloads and long service.

The Comet is driven from your marine engine by belt or by friction contact. Easy to install. We supply all fittings. Built in 6-8 volt up to 110 volt with several choices of ampere capacity in each voltage. We also build switchboards in many sizes, and the famous Comet D. C. Magnetos for make and break or jump spark ignition.

Write for Bulletin No. 5 and Prices

COMET ELECTRIC CO.
1241 St. Paul St., Indianapolis, Ind.

We Discover Solomon's Island

(*Continued from page 70*)

shrillest voice that ever soared above the din of a shipyard. Compared to him Davis sounded like a woodthrush.

"All right!" he screamed. "Cap'n, I'm a'-comin'—but you do the hollerin'. I say, his voice rose to high C, *"you do the hollerin'."*

That phrase immediately established itself with us as a domestic byword. Whenever I want the Professor to perform some household task such as hanging the curtains or shifting the furniture to lay the new carpet, he always replies,

"All right, Cap'n, but you do the hollerin'!"

That afternoon we slid off the ways and out past the steamer dock to where the schooners berth behind the lighthouse. Down the Creek the day had been stifling and noisy, out there a breeze ruffled the water, that blessed breeze that sundown always brings in the Chesapeake. It was to be our last night at Solomon's; we had supper on deck so that, the Captain said, we shouldn't miss the celebration. He nodded to the west, and I knew what he meant. Over the little island of Solomon's cloud upon fluffy cloud piled in billowy splendour, and as the sun sank it did things to those clouds and to that clear sky the recording of which would smash any normal typewriter to bits. And then the moon came, and stars, and lights twinkled at a hundred mastheads, but still that glow lingered in the western sky.

The captain was the first to break the long silence.

"When we get old, Kate," said he: "Lets get a boat and a black boy for cook and put down our anchor and just live here forever. Those Annapolis captains were pretty wise, weren't they?"

"Yu' an' yoh wife, Professuh," quoted the Captain's wife softly: "Yu' an' yoh wife'll sholy jes' love Sol'mon's."

If more detailed information concerning C. D. B. is desired, she is a raised deck cruiser, designed and built in 1915, by the Portsmouth Construction Company. She has an unusually roomy cockpit, two transom berths below, toilet and galley, with alcohol stove. She has more light and air below than is usual for a boat of her size and build. Excepting two coats of paint on her bottom, we do all our own repairs each summer, and of course we have installed numberless small comforts above and below which would not look important on paper, but which have tremendous significance for us on our long cruises. She draws two and a half feet, and has plenty of headroom. The engine is a two-cycle, two-cylinder Kennebec, heavy, durable and unfailingly reliable. Contrary to the general opinion concerning two-cycle engines, our Kennebec is extremely easy to start, provided we keep her clean and in good condition.

The Why of the Four-Cycle Motor

(*Continued from page 62*)

The general form is circular to which an approximately triangular appendage is attached. The profile is such that the rapidity with which the valve opens and closes can be varied within reasonable limits by the shape of the cam. The cam *A* for example would be for one, in which the valve opened quickly and remained opened for an appreciable period. That at *B* would be one for a mushroom type follower, which opened and closed without any perceptible interval between. That at *C* is typical and one in which the opening does not take place quite so suddenly but which remains open for a short interval. At *D* is shown a type which opens quickly, but closes very deliberately. The cam follower is at the end member on the push rod which rides on the face of the cam as it turns. From figure 23 it will be observed that for three-quarters of the rotation of the cam no motion takes place in the follower. As the cam comes underneath it, it is raised and a push rod forced upwards and its motion transmitted to the valve stem, causing this to be lifted from its seat and opened.

The assembled motor shown in figure 21 will illustrate the driving of the camshaft from the main engine shaft. Since the cams are all an integral portion of the shaft the relation of one cam to another is determined by the manufacturer when the parts are made. The only variation in timing possible is to change the relation of the teeth on the cam gear and shaft gear so as to make the camshaft turn earlier or later with relation to the main shaft. In addition it will be noted that there are two supplementary small gears which drive a shaft on each side of the motor. These are used to drive such accessories as the circulation pumps, the electric generator, the magneto and similar fittings.

Advertising Index will be found on page 134

Mathis-Built Houseboats

85 ft. Nahmeoka H. N. Baruch New York

80 ft. Nepenthe James Deering Chicago

52 ft. Helen Louise V. B. Hubbel New York

the choice of men who know—who can afford the best—like L. H. and A. W. Armour and James Deering of Chicago; like Henry W. Savage, Murray Guggenheim, H. N. Baruch, Arthur Curtiss James and W. J. Matheson of New York; like Clayton G. Dixon, Louis Burk and D. H. Carstairs of Philadelphia; like Col. S. L. H. Slocum of Washington, D. C.; like E. L. King and R. M. Bond of Daytona, Florida.

New 87 ft. Houseboat Nearing Completion

in our yards, embraces every best feature developed through years of specializing, all combined at a right price based on present construction costs. **Your personal ideas can be followed in the finishing touches, if you act promptly.**

MATHIS YACHT BUILDING COMPANY

COOPER'S POINT CAMDEN, NEW JERSEY

70 ft. Janai Ex. Com. Arthur Curtis James New York Yacht Club

106 ft. Chieftain L. H. & A. W. Armour Chicago

61 ft. Cyrene R. M. Bond Daytona, Florida

70 ft. Calabash W. J. Matheson New York

77 ft. Dorinda Henry W. Savage New York

106 ft. Leonie Murray Guggenheim New York

90 ft. Bolo Francis S. Whitten New York

McKinnon Reverse Gear

Isn't this just what you want in a reversing mechanism?

Mechanical Efficiency

Full power transmitted without loss, either direction. The McKinnon shows 97% power transmitted, either direction, on dynamometer test.

High Reverse Speed

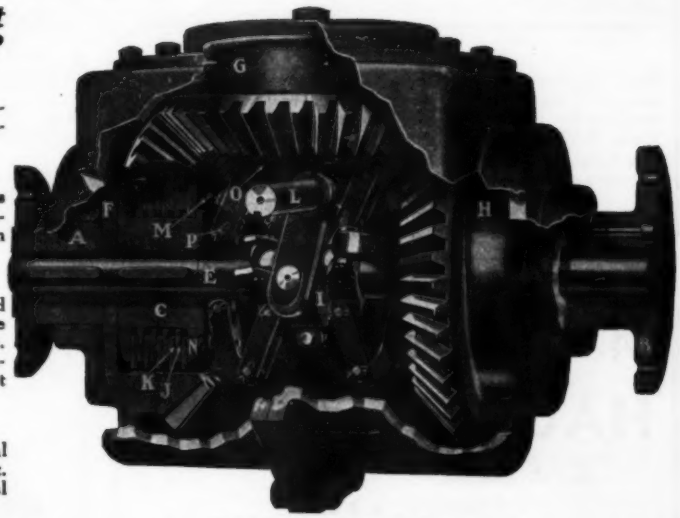
Full speed on reverse in the McKinnon means quick action. Reduced reverse speed is necessary in gears that consume too much power in intricate gearing.

Smooth Clutch Action

Easy, gradual engagement saves your engine and your shaft and bearings. Two big nine-plate multiple disc clutches are used in the McKinnon. Clutches may be slipped continuously without injury. These clutches will save your wheel if it strikes an obstruction.

Durability, Dependability

Big gears with large teeth, big bearings, liberal allowances of surplus strength for every part. McKinnon Gears have withstood heavy commercial service for years without repair.



Let us tell you the full details about the McKinnon Gear. Give us the data on your engine, including R. P. M.

Four Sizes Ready for Delivery

No. 1 transmits 4 H.P. per 100 R.P.M. No. 3 transmits 13 H.P. per 100 R.P.M.
No. 2 transmits 8 H.P. per 100 R.P.M. No. 4 transmits 20 H.P. per 100 R.P.M.

Other sizes in construction—Absolutely Guaranteed for One Year

McKINNON IRON WORKS COMPANY

Established 1880
ASHTABULA, OHIO

The GRAY BOAT

A Gentleman's Cruiser — 28 ft. long

Designed by a competent architect, constructed by master boat builders and finished throughout like a high grade yacht, The GRAY BOAT is everything you could desire in a cruiser of its size. Beauty, comfort, pleasure, safety, convenience, roomy accommodations and *class.*

Sleeps four inside, full headroom, light ventilated cabin separated from motor, toilet, folding basin, galley, stove, refrigerator, ample locker space, large cockpit. Absolutely complete cruising equipment.

De Luxe Model, mahogany finish, brass fittings.
Practical Man's Model, oak finish, galvanized fittings.

Powered with Fay & Bowen LN-41, 16 H.P. Speed 9-10 miles per hour.
Powered with Fay & Bowen LN-42, 30 H.P. Speed 11-12 miles per hour.

Write for prices.

GRAY BOATS, Friendship, Maine, U. S. A.

Your next boat

will be a stanch, long-lived craft if she is planked with

IDENTIFY THE GENUINE — BY THIS TRADE MARK

"TIDE WATER" CYPRESS "THE WOOD ETERNAL"

YOU'LL FIND THE "ARROW" — ON THE ENDS OF ALL BOARDS

CYPRESS has rot-resisting characteristics which make a Cypress boat a long-lived and *safe* boat. Get the *facts* in VOL. 19 of THE CYPRESS POCKET LIBRARY, "CYPRESS FOR BOATS and CANOES." Sent FREE with our compliments.

MANUFACTURERS: WRITE FOR INTERESTING DETAILS

Southern Cypress Manufacturers' Assn.

1317 Poydras Building, New Orleans, La., or
1317 Graham Bldg., Jacksonville, Fla.

Starts Any Engine Instantly

No engine is too big, too stiff or too stubborn to start instantly if you have installed the

"H-P" ACETYLENE NOZZLE

Screwed into the intake manifold and connected to a tank of Prest-O-Lite gas. Positively will fire on the first spark and keep the engine running until it picks up on regular fuel. Successfully used on all 2 and 4 cycle engines up to 300 H. P.

Will last a life time under ordinary conditions. Will never fail to do the work.

Write today for full details and prices. Salesmen Wanted Everywhere
Agency allotments now being made. A REAL PROPOSITION FOR LIVE DEALERS. PRICE $5.00 Postage Prepaid.

PEDERSEN ACETYLENE NOZZLE CO.
188 Montague Street, Brooklyn, N. Y.

"LIBERTY KID"

The Best Little Medium-Duty Marine Engine on the Market

High grade four cycle design, valve-in-head, removable cylinder head, bronze rocker arms, push-rods, plunger pump, etc. Over 200 in actual use.

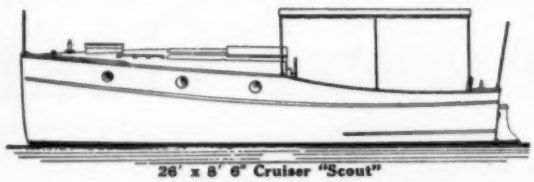
Immediate deliveries on early orders. Write for catalog and testimonials.

AGENTS AND DEALERS WANTED

A. G. HEBGEN
Manufacturer and Sole Distributor
440 Market St., San Francisco, Cal.

3½-4 H.P. 900 to 750 R. P. M.

Also built in "Liberty Twin" Double Cylinder Model giving 8-10 H.P., for gasoline or kerosene



26' x 8' 6" Cruiser "Scout"

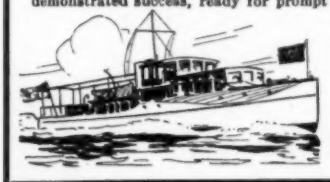
Built Right—Priced Right. This season's greatest boat value. Large cockpit, roomy cabin with toilet, galley and berths for four. Full headroom. 4-cycle motor, speed 9-10 M.P.H., fully equipped for cruising, $2,500. We furnish K.D. frames to complete outfits in both runabouts and cruisers. Let us quote on your requirements.

RICHARDSON BOAT CO.
370 Sweeney St., No. Tonawanda, N. Y.

DENSMORE

Marine Railways Repairs
Overhauling Laying Up Storage

Our facilities have no superior in the vicinity of Boston. The Densmore 73-ft. Standardized Cruising Yacht strikes a new note in high class yacht construction. A boat of known ability and demonstrated success, ready for prompt delivery. Details on request.



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Offices 79 Milk Street
Boston Plant, Atlantic, Mass.
J. M. Densmore, Naval Architect
Ralph E. Winslow, Consulting Naval Architect

14' "Marybelle"

And Other

HACKER

Designs Appearing in MoToR BoatinG

COMPLETE and K. D.

TENDERS

20 Page Catalogue for 4c in Stamps

WM. RICHARDS

On the HUDSON River, at Dyckman St., N. Y. C.
RAILWAYS — OVERHAULING — STORAGE

Model A4 Special 4-5 H.P.

Waterman Motors—

Known The World Over

This High Grade Power Unit is Offered at

Greatly Reduced Price

Write Promptly

For particulars and circulars

ARROW MOTOR & MACHINE CO.

738 Frelinghuysen Ave., Newark, N. J.

Advertising Index will be found on page 134

Lay Your Course Due WC

WHEN you're looking for good boat fittings lay a straight course for the WC Trade Mark, and you will land safely in the harbor of Satisfaction.

WC OIL COMPASS

One of the 1001 WC Products

Built to withstand the jars of power craft, sensitive and accurate under all conditions. Carefully tested and fully guaranteed. Sizes of dials: 2, 2½, 3, 4 and 5 inch. If not at your dealer's, write us and we will give you the name of a WC dealer. Also ask us for a copy of our Free Booklet, "Compass Talks and Tests"; or send 20c in stamps and we will inclose with the booklet a handy celluloid Course Protractor.

Get This Book of Helpful Hints for Boat Owners

"Sea Craft Suggestions and Supplies" solves those daily "puzzlers" that few know how to handle. Tells how to Box the Compass; what is Proper Ground Tackle; gives hints on Steering Gear, etc.; describes WC Dependable Marine Hardware; tells uses. Compiled from 75 years' experience in making marine fittings. 50c prepaid.

WILCOX, CRITTENDEN & CO., INC.
4 South Main St., Middletown, Conn.
ESTABLISHED 1847

Be Sure It's a

SYRACUSE REVERSE GEAR

A Complete Unit

There may be other reverse gears *as good* as the Syracuse—there is none better. And there is no other gear embodying an elevated rear starter, built in as an integral part of the design.

An Extra Good Gear Plus An Extra Good Starter

An elevated starter is a great advantage in the boat. It saves bending over and standing on your head to start the engine. It has a big gear reduction that makes it easy to turn 'er over. A 40 H.P. engine starts as easy as a 15 or 20 H.P. You can save the big cost of an electric starter if you choose a Syracuse Gear.

The reversing mechanism is correctly designed and accurately made. The complete enclosure keeps the oil in and the dirt out. It is always properly lubricated without special attention.

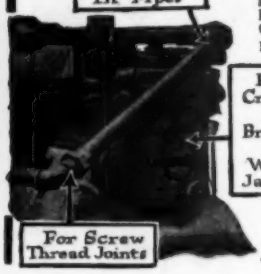
Made in sizes from 10 H.P. to 100 H.P. We also supply open types of gears when desired, and specialize particularly in gears for powerful high speed motors such as the 100 H.P. Hall-Scott.

Write today for latest catalog with reduced prices

SYRACUSE GEAR CO. **Syracuse, N. Y.**

SMOOTH-ON

HERE'S YOUR REPAIR BILL!



Repairs on Motor Boat," $25.00

Practically all of this expense could have been saved if Smooth-On Iron Cement No. 1 had been used. Repairs cracked waterjackets, leaky screw-thread joints, scored cylinders, etc., quickly, easily and economically.

Send for our illustrated Motor & Home Repair Booklet. It's FREE —write for it today.

Smooth-On Iron Cement No. 1 comes in 6 oz., 1 lb., and 5 lb. tins. Also in larger sizes.

Sold by Supply Houses

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Dept. 24-E
Jersey City, N. J., U. S. A.

Peterborough

Since 1879

HIGH GRADE MOTOR CRAFT

16 to 20 foot models for prompt shipment.

CANOES — SKIFFS — OUTBOARD BOATS

Let us quote you delivered prices. We give you all the distinctive Canadian features at no extra cost. Good service to people visiting Canada. Our plant is on the famous Trent Waterway.

Canadian Distributors for Evinrude Motors.

PETERBOROUGH CANOE CO., LIMITED
288 Water Street — Peterborough, Canada

B. Schellenberg & Sons

EVERYTHING FOR THE PERSON OF THE YACHTSMAN, HIS OFFICERS AND HIS CREW

Clubs, yacht owners, commercial boat owners, should take advantage of our many years' experience in outfitting the mariner, both inland and deep sea.

Crews and Club Attendants furnished without Charge.

B. SCHELLENBERG & SONS
99 to 105 Myrtle Ave., near Bridge St.
Brooklyn, N. Y.
Telephone: Main 0804.

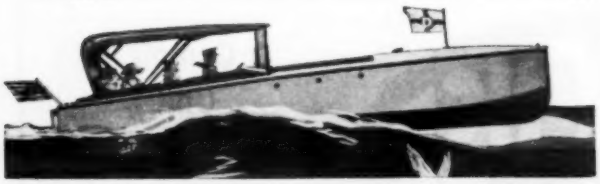
The Compass For Your Boat

should be the best obtainable. For seventy years Ritchie compasses have been the choice of experienced navigators.

Select the Ritchie for your boat.

Our catalog will show you the one best suited for your needs. Send for a copy today.

E. S. RITCHIE & SONS
Established 1850
110 Cypress Street
Brookline, Mass.



The Speedy Runabouts, Trim Cruisers and Open Motor Boats bearing the Racine Wis trade-mark give their owners keen pleasure and complete satisfaction.

We also build standardized runabouts, open motor boats, special boats for outboard motors, rowboats, and the famous Racine Wis line of canoes. We will design and build a boat according to your specifications.

Tell us the kind of a boat in which you are interested and we will mail you descriptive catalog.

RACINE BOAT COMPANY, 1908 Holman Street, Racine, Wisconsin
Pioneer Boat Builders of the West

"Whistle Wing" BOATS and CANOES

Trade Mark

were formerly known as

The ORIGINAL ST. LAWRENCE SKIFFS, SQUARE STERN ROWBOATS

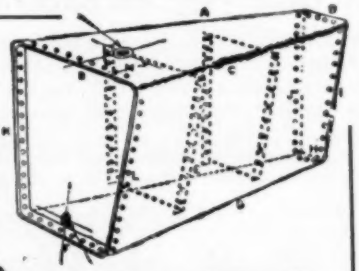
and

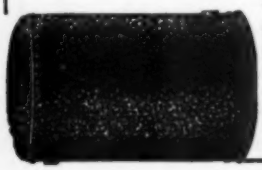
RUSHTON'S "INDIAN GIRL" CANVAS CANOES

Write for our circulars and prices

ST. LAWRENCE BOAT WORKS, Inc.
OGDENSBURG — NEW YORK

Gasoline Tanks, Air Whistle Tanks, Mufflers, Stacks, Special Plate and Sheet Metal Work for Pleasure Boats.





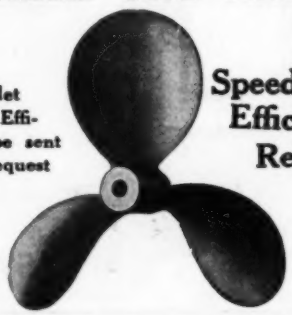
L. O. Koven & Brother

Main Office,
158 Ogden Ave. — Jersey City, N. J.

Branch, 50 Cliff St., New York City

HYDE TURBINE TYPE PROPELLERS

Our booklet "Propeller Efficiency" will be sent free upon request



Speed
Efficiency
Reliability

HYDE WINDLASS CO., Dept. B, Bath, Maine, U.S.A.

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Don't Wait Until Decoration Day!

Place your order NOW to insure prompt delivery

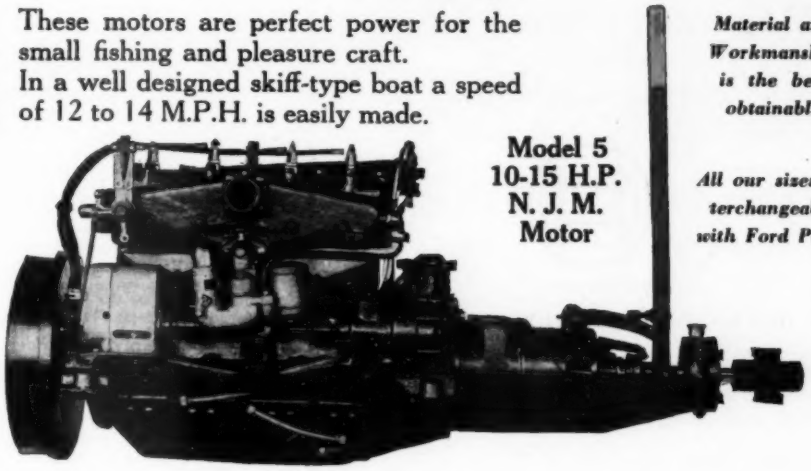
MARINE MOTORS

Price $375.00

including Reverse Gear

Send for Folder Today

These motors are perfect power for the small fishing and pleasure craft.
In a well designed skiff-type boat a speed of 12 to 14 M.P.H. is easily made.



Model 5
10-15 H.P.
N. J. M.
Motor

Material and Workmanship is the best obtainable

All our sizes interchangeable with Ford Parts

New Jersey Motor Sales Company

KEYPORT, NEW JERSEY

The Belle Isle BEAR CAT

"America's Finest Runabout"

"IT'S the Pierce-Arrow of powerboats", says the editor of Popular Mechanics, who owns one. Standardization and quantity production make the Bearcat an unapproached value the world over. Ready in stock for immediate shipment. Write for illustrated catalogue.

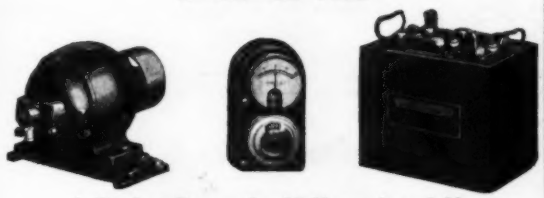
26' overall
6' 6" beam
10 passengers
35 M. P. H.
$6,500 complete

Bearcat, Jr.
7 passengers
25 M. P. H.
$3,300 complete

BELLE ISLE BOAT & ENGINE CO., DETROIT, MICH.
New York Sales Representative: Lord Auckland
Bearcat on exhibit at 19 W. 44th St., N. Y. C.

"Dayton" Lighting and Ignition Systems

6—12—32 Volts



A Product Proven by 20 Years Actual Use.
Write for Catalog and Prices.

THE A-C ELECTRICAL MFG. CO.

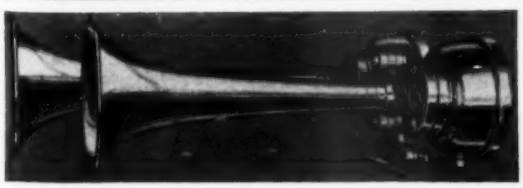
New York Distributor
A. A. Allen, 39 Cortlandt St.

Dayton, Ohio

DECK CANVAS-ALL WIDTHS

YACHT SAILS-AWNINGS-SPRAY HOODS - Etc.

GEO. R. BURROWS. Inc. 2 South St New York



YOUR SAFETY ON NAVIGABLE WATERS

Demands an adequate audible signal. The super-powerful, long-distance

"STROMBOS"

has made whistles and auto horns obsolete. One user reports being heard 6 miles. Biggest ships respond to it; drawbridges open promptly far ahead. Gives your boat a prestige obtainable no other way. Used on the "Nourmahal" and by new fine yachts generally. Send post card today for Circular G.

AMERICAN STROMBOS CO.

5 So. 18th St., Philadelphia New York, 507 5th Ave.

MOTOR BOAT USERS

rely implicitly on the *original*

ROBERT BOSCH

Magnetos—Spark Plugs

and other products

distinguished by this Sign of Quality and Service:

TRADE MARK

because of proved performance for thirty-five years.

Always specify the *original* Robert Bosch when ordering.

Interesting literature mailed on request.

Robert Bosch Magneto Co., Inc.

The World's Foremost Makers of Automotive Electrical Equipment

OTTO HEINS, President

123 West 64th Street New York, N. Y.

TWIN

Higher Service-Longer Life

DRY CELL

Patented

7.5 Volt Ignition Battery

WATERPROOF

The **SILENT DEATH** of a dry battery is caused by water. You can't see this consumption but moisture will slowly render your battery less and less effective.

Besides rendering **TWICE THE SERVICE LIFE** and a higher maintained voltage, the Twin is the only **WATERPROOF** dry battery made without the use of a costly metal case.

In any shape or voltage desired; dealers and users write for facts.

A AND B RADIOPHONE dry batteries for your boat—portable, clean and efficient.

Manufactured by

The Twin Dry Cell Battery Co.

CLEVELAND, OHIO, U. S. A.

What Uncle Sam Requires of You

(*Continued from page* 14)

Planks, grating, etc., or small boats in tow cannot be substituted for required life-saving appliances. Floats of seasoned wood, not exceeding white pine in weight, and measuring at least 4 feet by 14 inches by 2 inches, may be used.

A fire extinguisher capable of extinguishing gasoline fires.

At anchor, a white light only, less than 20 feet above the hull, visible around horizon for at least one mile.

Two copies of the Pilot Rules must be carried on board.

Equipment for motor boats under 65 feet in length carrying passengers for hire. All equipment mentioned above except that one regulation life preserver for each person on board must be carried.

Equipment for motor boats over 65 feet in length not carrying passengers for hire. One life preserver or buoyant cushion for each person on board. A fire extinguisher.

Motor boats operating on other than Federal waterways, that is, inland lakes which do not form part of the boundary line between two states or between this country and Canada, are obliged to pay the same war tax but are not required to carry the equipment required by the Federal Government.

Boats operating on the inland waterways are under the jurisdiction of the various state governments which make their own laws as to the required equipment.

License To Carry Passengers For Hire.

In order to carry passengers for hire the operator of a boat which engages in this service must be duly licensed by the local board of steamboat inspectors. No examination shall be required as a condition of obtaining such a license, and any such license shall be revoked or suspended by the local board of inspectors for misconduct, gross negligence, recklessness in navigation, intemperance, or violation of law on the part of the holder, and if revoked the person holding such license shall be incapable of obtaining another such license for one year from the date of revocation.

Inspection of Hull and Machinery

The hull and machinery of every motor boat over 65 feet in length, carrying passengers for hire or for trade, must be inspected. Such other provisions of law for the better security of life as may be applicable to such vessels shall, by the regulations of the Board of Supervising Inspectors, also be required to be complied with before a certificate of inspection shall be granted; and no such vessel shall be navigated without a licensed engineer and a licensed pilot.

No motor boats of less than 65 feet in length are required to have their hulls and machinery inspected, except those motor boats of over 15 gross tons carrying freight or passengers for hire but not engaged in fishing as a regular business, are subject to inspection whether under or over 65 feet in length. Neither are any motor boats of less than 65 feet in length required to have a licensed pilot or engineer except those carrying passengers for hire which must be operated by a licensed operator and motor boats of over 15 tons gross, engaged in trade, which must have a licensed engineer and a licensed pilot.

Motor boats subject to inspection cannot be navigated unless they have certificates and have on board such complements of licensed officers and crew, including certificated life-boatmen, as may in the judgment of the local inspectors be necessary for her safe navigation.

Motor boats and motor yachts used for pleasure purposes only are not subject to inspection nor are they required to have a licensed captain, engineer or crew. This rule holds good irrespective of boat's length or size.

Documented boats must have the name and home port on the stern and the name on each bow. Numbered motor boats are not required to carry a name on stern or bow, although it is recommended that they do.

Supervising and Local Inspection Districts.

The local board of steamboat inspectors of the various ports issue certificates for licensed pilots and engineers. Application should be made to any of these for information relative to obtaining certificates, examinations, etc.

Supervising inspection districts	Local inspection districts (ports)
First ....San Francisco, Cal.	Charleston, S. C.
Honolulu, Hawaii	Jacksonville, Fla.
Los Angeles, Cal.	Savannah, Ga.
Portland, Ore.	Fourth ..St. Louis, Mo.
Second ..New York, N. Y.	Dubuque, Iowa
Albany, N. Y.	Fifth ....Boston, Mass.
New Haven, Conn.	Bangor, Me.
Philadelphia, Pa.	New London, Conn.
Third ....Norfolk, Va.	Portland, Me.
Baltimore, Md.	Providence, R. I.

(*Continued on page* 86)

Advertising Index will be found on page 134

"It's a Wise Boat That Knows Its Own Speed!"

Cap'n Allswell
Columbian
Spokesman

—says Cap'n Allswell—"take this Socony Barge No. 7. She's a 145-footer, draws 6½ feet of water, and holds 250 tons. She's powered with a couple of 200 horse Wintons turning around 400.

"Her job is to make a big string of oil and gas stations every day and *do it on time.* So, to get the full power of her wonderful engines, they fitted her out with 58 x 30 Columbian Bronze Propellers.

"Specifications called for 8 knots. Did she ante up? You bet she did, and nearly a full knot more—provin' that a good engine and a good wheel make a mighty spirited team, providin' the wheel's a Columbian."

The Cap'n will gladly send you Folder No. 5 fully describing the Columbian line.

THE COLUMBIAN BRONZE CORP., 522 Fifth Avenue, New York City

For New York City Sales Only: 44 Third Avenue

COLUMBIAN *Bronze* PROPELLERS

Worth While Points

3 *Steady light without flicker*

COLUMBIAN ELECTRIC LIGHT AND POWER

C-Y-C Model

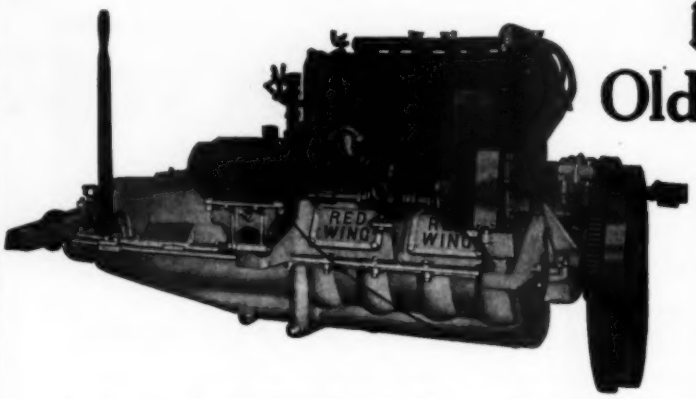
COLUMBIAN plants produce a steady flow of light without the slightest flicker.

Interaction of the generator and battery produce a positive governing action eliminating the need of a mechanical governor.

A number of other complicated mechanical devices have been done away with, making a simple but efficient plant.

Our Folder No. 5 will interest you.

COLUMBIAN BRONZE CORPORATION
522 Fifth Ave., New York City
New York City Sales Only: 44 Third Ave.



Red Wing Thorobred
THE MOTOR WITH POWER TO SPARE

Old Timers Know

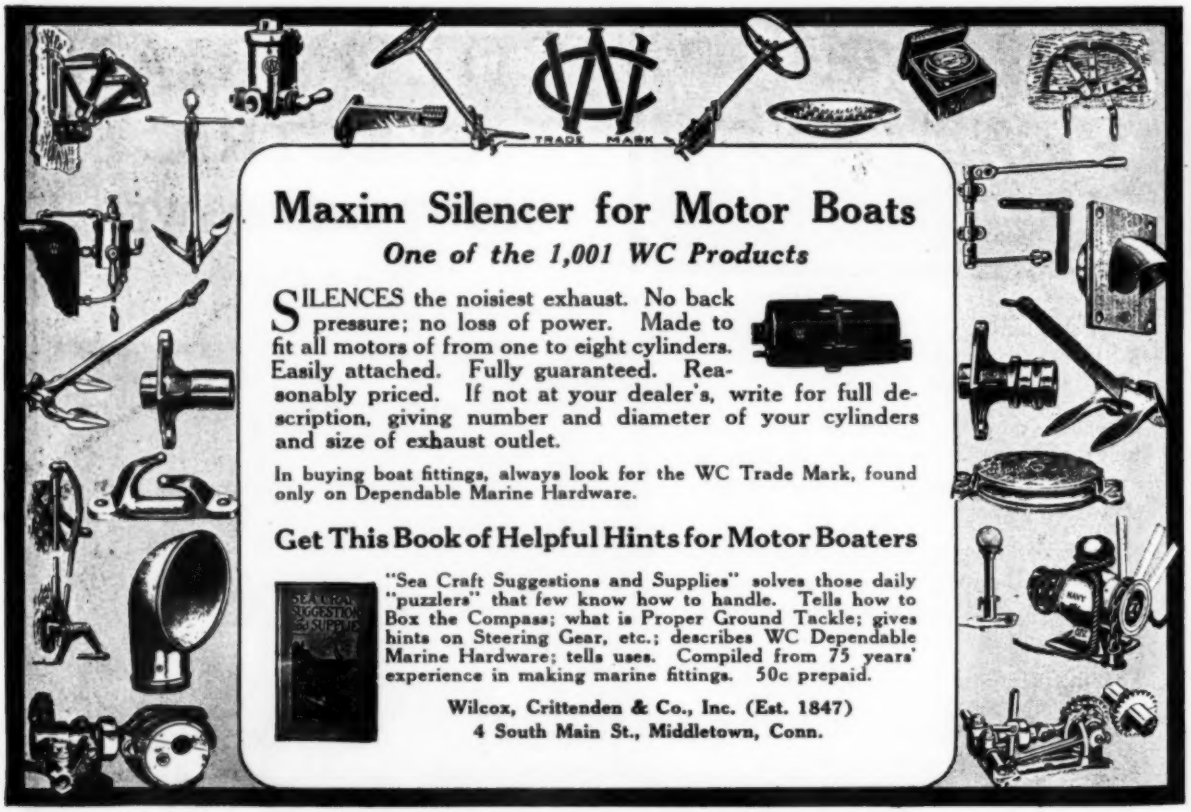
Many of the older "bugs" well remember, a few years ago, of much advertised brands of motors which have now disappeared entirely from the market. Many of these same men have cause to regret having bought one of these transitory creations of mechanical impetuosity. They've forgotten which junk pile they threw it on.

The philosophy of which is: Buy a standard, known, guaranteed, in-the-business-to-stay motor, one that has stood the time test, one on which the guarantee is good.

"THOROBREDS" are the real goods, be it our 10-14 H.P. "BABY DOLL" or our other four larger sizes. Write us for details on the size and horse power you're interested in.

RED WING MOTOR COMPANY, Dept. B, Red Wing, Minn., U. S. A.

Eastern Distributors: Verrier, Eddy Co., 222 E. 42nd St., New York, N. Y.; W. H. Morëton Corp., 780 Commonwealth Ave., Boston, Mass.; W. E. Gochenaur Mfg. Co., 631 Arch St., Philadelphia, Pa., Hutchinson Bros., Alexandria Bay, N. Y.



Maxim Silencer for Motor Boats

One of the 1,001 WC Products

SILENCES the noisiest exhaust. No back pressure; no loss of power. Made to fit all motors of from one to eight cylinders. Easily attached. Fully guaranteed. Reasonably priced. If not at your dealer's, write for full description, giving number and diameter of your cylinders and size of exhaust outlet.

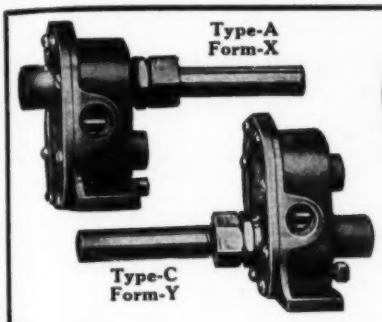
In buying boat fittings, always look for the WC Trade Mark, found only on Dependable Marine Hardware.

Get This Book of Helpful Hints for Motor Boaters

"Sea Craft Suggestions and Supplies" solves those daily "puzzlers" that few know how to handle. Tells how to Box the Compass; what is Proper Ground Tackle; gives hints on Steering Gear, etc.; describes WC Dependable Marine Hardware; tells uses. Compiled from 75 years' experience in making marine fittings. 50c prepaid.

Wilcox, Crittenden & Co., Inc. (Est. 1847)
4 South Main St., Middletown, Conn.

Advertising Index will be found on page 134



Oberdorfer Pumps

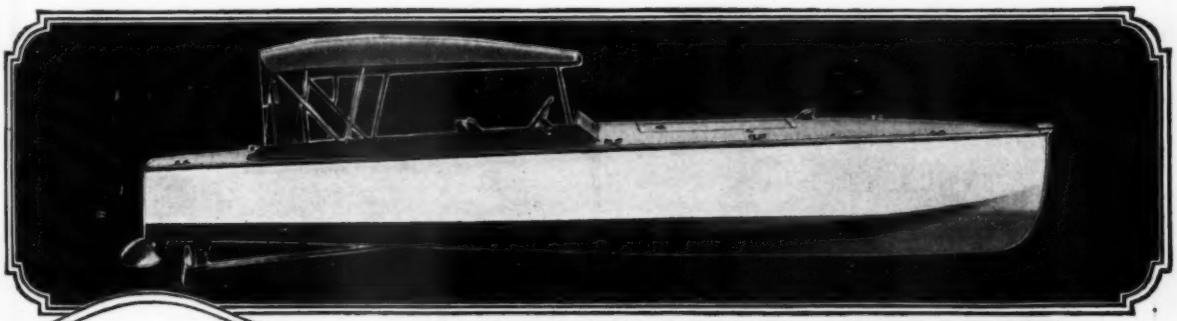
The finest power plant made will not operate properly if it is equipped with an inferior pump, whether it supplies water, fuel or oil.

OBERDORFER BRONZE GEARED PUMPS

are built especially for marine use—they are made to withstand the hard service encountered in use on board boat—*Oberdorfer Bronze Geared Pumps* are noiseless, automatic, compact and reliable. The supply of water, fuel or oil is governed entirely by the motor—*there is never an over or under supply.* If you have ever had trouble with your pump you will find a world of satisfaction in the trouble-proof Oberdorfer.

If you own a boat powered with an internal combustion engine you will be interested in our new book on pumps. Your copy is ready for you—it comes *free* on your request.

M. L. OBERDORFER BRASS CO., 125 Thompson Road, Syracuse, N. Y.



MULLINS
"V" Bottom
Boat
—
A
Proved
Success
—

MULLINS STEEL BOATS CAN'T SINK

Because of its dependable motors, light draft and tendency to "plane," the Mullins "V" gets more speed per H.P., on less gasoline, than a round bottom. Safety and comfort are not sacrificed for speed — the "V" bottom prevents rolling, pounding and plunging. Puncture-proof steel hull — can't leak, warp, dry out, rot or waterlog. No seams to open — no calking or scraping. Airtight compartments fore and aft make every Mullins Boat unsinkable. Over 75,000 in use. Used by U. S. and foreign governments. Designed by foremost naval architects—made for 25 years in world's largest boat factory. Write for catalogs of power boats, rowboats and canoes — *free* on request.

MULLINS BODY CORP., *Boat Dept.*, 644 Depot St., Salem, Ohio

Worth Waiting For

In a few weeks, about May 15, you will be able to secure the hand fire extinguisher that every test on all types of fire, including electric, on land and sea has proven best. Don't order inferior extinguishers hastily, *wait for the* ENDFIRE.

The ENDFIRE is the only fire extinguisher that operates on the rotary principle, thus insuring that a steady, constant stream can be played in any direction from any angle.

The ENDFIRE gets into action instantly, never fails to work and can be used by a child.

ENDFIRE Fluid does not freeze nor deteriorate and is non-injurious to user, fabric or machinery.

Wait for the ENDFIRE, *but in the meantime send for descriptive booklet.*

ENDFIRE

Ends Fire

Manufactured by

D. & O. G. Heyen, Inc.

41 Park Row, N. Y. C. Tel. Applegate 4874

J. E. Caldwell & Co.

Jewelry—Silver—Stationery

PHILADELPHIA

Designers and Makers
of Important Trophies
In Precious Metals

PATRONS desiring less pretentious prizes are invited to consider the stocks of silver loving-cups, trophies, vases, bowls, and other suitable pieces.

The Caldwell collection further includes articles for every use to which silver is adapted—tea sets, dinnerware, after-dinner coffee sets, dessert services, candlesticks, centerpieces, flower vases, epergnes, flatware and servers, cigarette boxes, toilet requisites, etc.

Information, Illustrations and
Approval Selections Promptly
Forwarded

What Uncle Sam Requires of You

(*Continued from page 82*)

Sixth....	Louisville, Ky.	Ninth....	Cleveland, Ohio
	Evansville, Ind.		Buffalo, N. Y.
	Memphis, Tenn.		Burlington, Vt.
	Nashville, Tenn.		Oswego, N. Y.
Seventh..	Pittsburgh, Pa.		Toledo, Ohio
	Cincinnatti, Ohio	Tenth....	New Orleans, La.
	Pt. Pleasant, W. Va.		Apalachicola, Fla.
Eighth...	Detroit, Mich.		Galveston, Tex.
	Chicago, Ill.		Mobile, Ala.
	Duluth, Minn.		San Juan, P. R.
	Grand Haven, Mich.		Tampa, Fla..
	Marquette, Mich.	Eleventh.	Seattle, Wash.
	Milwaukee, Wis.		Juneau, Alaska
	Port Huron, Mich.		St. Michael, Alaska

The licensing of pilots and engineers for boats of over fifteen tons gross or over 65 feet in length engaged in trade should not be confused with the operator's license which is required for motor boats of under 65 feet in length or under sixteen tons carrying passengers for hire. On motor boats of this size carrying passengers for hire only an operator's license is required.

GOVERNMENT PUBLICATIONS

In order to make easier the work of the navigator the government authorities publish a vast store of useful information in the form of books, charts, tables, etc. The cost of these is trifling and every small boat operator should secure for himself all that he is apt to need. Among the most useful of these are the Coast Pilots, these contain much information concerning the localities along the coast with which a visitor may not be entirely familiar. Another useful book is the Light List as well as the Buoy List. These tabulate the aids to navigation geographically and identify each light according to its own characteristics. Tide Tables are particularly useful in that they give the predicted time of high and low water at practically every important point along both the Atlantic and Pacific coasts. Charts are also published by the Coast and Geodetic Survey Office, and are kept corrected to the latest information. Notices to Mariners is a little weekly bulletin which lists all changes in navigation aids which have taken place during the preceding week. This is sent free to any interested navigators by the Government printing office.

Many agencies for the sale and distribution of these various publications have been established and the list which follows is complete. Chart catalogs and all other publications of the Government offices, such as the Coast and Geodetic Survey, the Hydrographic Office of the Navy Department, can be secured from them.

Chart catalogues published by the Coast and Geodetic Survey are distributed free by any of the agents for the sale of charts and other publications listed below:

Maine—Bar Harbor: Fifield & Joy. Bath: Charles Harriman, 106 Front Street. Belfast: Newton S. Lord, 31 Front Street. Boothbay Harbor: R. G. Hodgdon. Camden: The Village Shop, 25 Main Street. Eastport: S. L. Wadsworth & Son, 5-8 Central Wharf. Jonesport: E. B. Sawyer. Machiasport: Willard S. Cates. North Haven: W. S. Hopkins. Northeast Harbor: The A. G. Bain Co. Portland: Wm. Senter & Co., 51 Exchange Street. Rockland: Huston-Tuttle Book Co., 405 Main Street. Vinal Haven: O. V. Drew.

New Hampshire—Portsmouth: W. S. Jackson.

Massachusetts—Boston: Coast and Geodetic Survey Field Station, 1806 Customhouse. W. E. Hadlock & Co., 152 State Street. C. C. Hutchinson, 154 State Street. Kelvin & Wilfrid O. White Co., 112 State Street. Gloucester: George H. Bibber, 161 Main Street; George K. Rodgers, 150 Main Street; and F. S. Thompson, 164 Main Street. Nantucket: H. Marshall Gardiner. New Bedford: Briggs & Beckman, 31-35 Commercial Street, and The Arthur C. Smith Co., 27 Williams Street. Vineyard Haven: E. R. Tilton. Woods Hole: The Book Shop. (Dr. Elizabeth Dunn.)

Rhode Island—Block Island: C. C. Ball. Newport: W. H. Tibbetts, 185 Thames Street. Providence: Goff & Page, 54 Custom House Street.

Connecticut—Bridgeport: Hugh I. Morris, Customhouse. Middletown: Hazen's Bookstore, 198 Main Street. New Haven: Edward A. Welch, Customhouse. New London: Edwin Keeney Co., corner Bank and State Streets, and The Darrow & Comstock Co., 114 Bank Street. South Norwalk: Chas. J. Prescott. Stamford: Fred A. Taff, 343 Atlantic Street.

New York—Albany: B. Lodge & Co., 91 North Pearl Street. Greenport: George B. Preston. Huntington: Huntington Hardware Co. New York: John Bliss & Co., 128 Front Street; Coast and Geodetic Field Station, 503 Customhouse; C. S. Hammond & Co., 30 Church Street; Kelvin & Wilfrid O. White Co., 38 Water Street; R. Merrill's Sons (Inc.), 66 South Street; Motor Boat Publishing Co., 239 West Thirty-ninth Street; T. S. & J. D. Negus, 140 Water Street; Rand, McNally & Co., 40-42 East Twenty-second Street; Michael Rupp & Co., 112 Broad Street. Newburgh: Betsy Ross Flag Co. (Inc.). Northport: Charles S. Mott.

New Jersey—Atlantic City: Service Station Co., Massachusetts and Atlantic Avenues. Newark: American Marine Supply Co., 260 Market Street.

Delaware—Wilmington: David A. Hay & Co., 121 Market Street.

Pennsylvania—Philadelphia: John E. Hand & Sons Co., 208 Chestnut Street; Riggs & Bros., 310 Market Street.

Maryland—Baltimore: John E. Hand & Sons Co., 17 South Gay Street.

District of Columbia—Washington: Brentano's, 1200 F Street N.W.; Government Printing Office; and Coast and Geodetic Survey Office.

Virginia—Newport News: W. L. Shumate & Co., 133 Twenty-fifth Street.

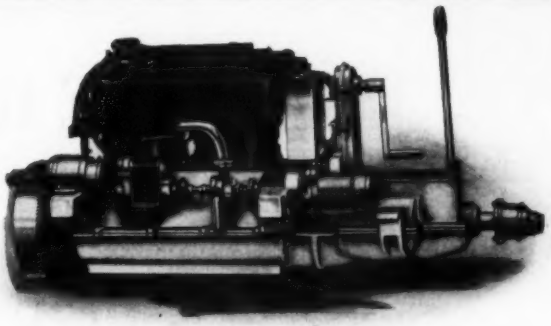
(*Continued on page 90*)

Advertising Index will be found on page 134

A New BRENNAN
at a New Price

Prices Reduced Again. No Extras

The new improved Brennan for 1922 is now ready for quick delivery on your order. When you've studied the specifications of this motor and heard the new price it won't take you long to decide where to place your order. In all our experience we have never offered such absolute value before.



17-20 H.P. Brennan Model "M"

Brennan Standard Motors Lead in Marine Value

The 1922 Brennans are a development of the famous motors we have been building for several seasons. Their design is thoroughly perfected and seasoned by actual service, under all kinds of boating conditions.

Experienced engine buyers are equally afraid of new untried designs and old out-of-date models. The 1922 Brennan is an up-to-the-minute motor with years of successful engine building experience back of it.

The Brennan is a complete power plant with two unit electric lighting and starting system, and every other accessory built in. No extras required as our equipment embodies a complete outfit. This applies also to the Brennan Model B medium duty 25-35 H.P., and the Model B high speed type 35-40 H.P.

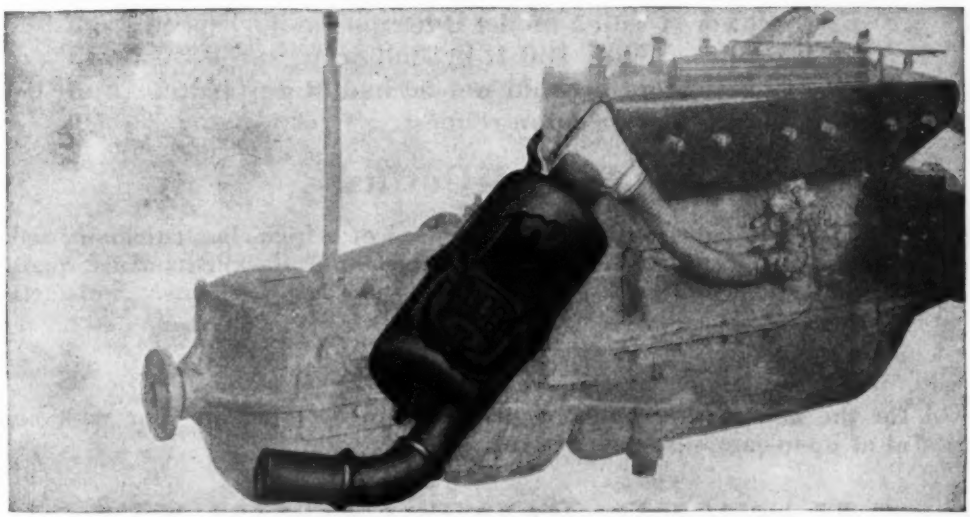
At our new reduced prices this completely equipped motor including electric starter costs you no more than an ordinary motor without equipment.

Write today for catalog and prices. Order quick if you want early delivery.

Brennan Motor Mfg. Co., 500 East Water St., Syracuse, N.Y., U.S.A.

Cable Address "Binot"

The Tvedt Adjustable Marine Muffler
Speed and Power with Silence



ADJUSTED WITH MOTOR IN ACTUAL OPERATION

Silence without Back Pressure

THE only marine engine muffler which when applied to an engine of approximate size for which it is intended, can be adjusted to that particular motor to produce silence without loss of power and efficiency of the engine.

Built in sizes for 1½ to 5″ exhaust connections.

Write for descriptive catalog

Tvedt-Smith Company, Worcester, Mass., New York Office, 103 Franklin St.

Also Manufacturers of the Tvedt Adjustable Tiller Quadrant

HACKER - CRAFT

AMERICA'S FINEST RUNABOUTS
PROPERLY DESIGNED HONESTLY BUILT

Ask Any Owner

26-Foot Special Runabout

We can still make good delivery on a few of these special mahogany runabouts. They are completely equipped in every respect. Powered with a model D Scripps motor, speed from 23 to 25 miles. With 100 H.P. Hall-Scott, speed 30 to 33 miles. A better outfit could not be had at any price. Full particulars will be sent upon request.

Special Outfits

We are prepared to figure with you on any kind of a high-class runabout, sedan or limousine proposition. Speed guaranteed, and Hacker-standard quality. Prints, specifications and price upon knowing your requirements. Satisfaction guaranteed.

Hacker Plans

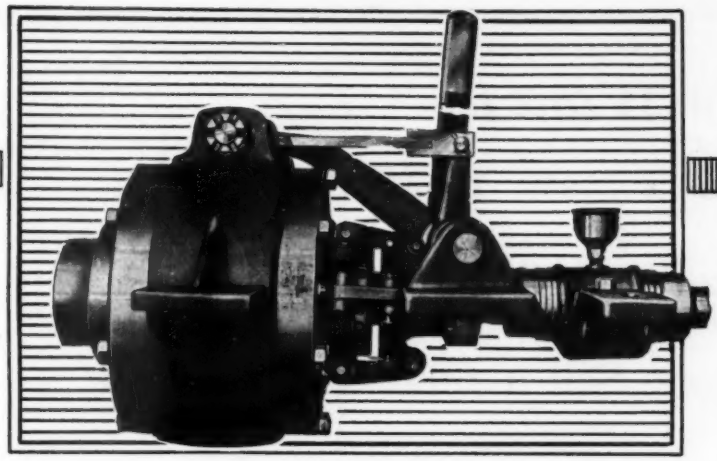
Send for the new Hacker book of plans before deciding on your next boat. Brimful of up-to-date high-class designs.

HACKER BOAT COMPANY

1525 CRANE AVENUE DETROIT, MICHIGAN

Arrangement has been made with Fellows & Stewart, of Wilmington, Calif., to build 26-foot Standardized Boat in California.

Advertising Index will be found on page 134



Joes Gears Have Helped Win More Big Races Than All Other Gears on the Market

The reliable Joes Gears handled the power that carried Miss America to her famous record-breaking victory. Gar Junior II was equipped with Joes Gears when she made her record run from Miami to New York. Baby Gar, which holds the record for displacement boats, relies on Joes Gears.

Miss Minneapolis, the five Misses Detroit, both Misses America, Miss Toronto, Miss Chicago, and practically all the victorious boats in the big speed contests in recent years have pinned their faith to Joes Gears; and have found their faith justified. Joes Gears have proved the most successful racing gears ever produced.

Multiple Disc Clutch

The forward drive is transmitted through Multiple Disc Clutches, not through locked gear teeth; which is why so small and compact a gear can transmit the terrific power of a 12-cylinder high speed motor without danger of falling down at a critical moment in a race. Special gears of this type weighing only 170 lbs. handle the power of motors rated at 450 H.P. per 1800 R.P.M.

For Work Boats, Too

Joes Reverse Gears, Safety Rear Starters, and One Way Clutches are also suitable for all kinds of work boats, commercial boats, passenger boats and pleasure boats.

Write for Latest Bulletin and 1922 Prices.

The Snow & Petrelli Mfg. Co.
156-B, Brewery St. New Haven, Conn.

JOES FAMOUS REVERSE GEARS

80% - 88% REVERSE SPEED RATIO

Do You Want to—

Build a New Boat

or

Doctor Your Old One

or

Buy or Sell a Boat

or

Take a Cruise in Strange Waters

And

Get all of the news of the motor boating world?

Then you want the magazine that answers every need of the boatman—that is edited by boating men for boating men and women—"The National Magazine of Motor Boating"—

MoToR BoatinG

The Correspondence Course on Dead Reckoning, now running in MoToR BoatinG, is alone worth the $3.00 that a subscription would cost you. Look this issue over—then keep in mind the big Summer race and cruise stories that will be coming in the next few months—and mail the attached coupon today! Then MoToR BoatinG will be delivered to you every month as soon as it is off the press.

Use this coupon for your convenience

MoToR BoatinG
Dept. MB522
119 West 40th Street
New York, N. Y.

Gentlemen:

Enclosed find $3.00 for which send me MoToR BoatinG for one year. (Canadian Postage free; Foreign, $1 extra a year.)

Name .....

Street No. .....

City ..... State.....

What Uncle Sam Requires of You

(*Continued from page* 86)

Norfolk: William Freeman & Sons (Inc.), 243 Granby Street, and John E. Hand & Sons Co., 114 West Plume Street.
South Carolina—Beaufort: P. A. Roper, Customhouse. Charleston: H. B. Kirk, 10 Broad Street.
Georgia—Brunswick: C. Bangs, Customhouse. Savannah: Geo. I. Morris, Customhouse.
Florida—Apalachicola: J. E. Grady & Co., Water Street. Fernandina: Scott M. Thompson. Fort Myers: James B. Parker. Jacksonville: The H. & W. B. Drew Co. Key West: Alfred Brost, Customhouse. Miami: Frank T. Budge. Pensacola: McKenzie Oerting & Co., 603 Palafox Street. St. Petersburg: Avery & Roberts Marine Ways Co. (Inc.). Tampa: Tampa Book & Staticnery Co. (Inc.). Tarpon Springs: Webster Little. West Palm Beach: Palm Beach Mercantile Co.
Alabama—Mobile: Cowles Ship Supply Co. (Inc.), 13-19 Dauphin Street.
Mississippi—Biloxi: Marine Supply Co. Gulfport: C. A. Simpson Co.
Louisiana—New Orleans: Coast and Geodetic Survey field station, 314 Customhouse. Kokosky & Co., 614 Gravier Street. J. S. Sareussen, 211 South Peter Street. Woodward, Wright & Co., corner Howard Avenue and Constance Street.
Texas—Galveston: Purdy Bros., 2217 Market Street; and Fred E. Trube, 2415 Market Street. Port Arthur: N. M. Nielsen, 417 Austin Avenue.
Cuba—Habana: Eduardo Menció, 42 O'Reilly Street. Manzanillo: Enrique Lauten, Marti 46, Apartado 104.
Porto Rico—Plaza Provision Co., 13 Cruz Street.
Mexico—Tampico: Vigil, Luna y Cia.
Canal Zone—Cristobal: Captain of the port.
California—Eureka: C. O. Lincoln & Co., 226 F Street. Long Beach: J. G. Spielman, 136 West Third Street. Los Angeles: H. S. Crocker Co. (Inc.), 723 South Hill Street. San Diego: Arey-Jones Co., 933 Fourth Street. San Francisco: Coast and Geodetic Survey field station, 310 Customhouse. Geo. E. Butler, Alaska Commercial Building, 356 California Street. A. Lietz Co., 61 Post Street. Henry Taylor, 500 Battery Street. Louis Weule Co., 6 California Street. San Pedro: Marine Hardware Co., 509 Beacon Street; and J. C. Rudbach (Inc.), 223-225 Sixth Street.
Oregon—Astoria: The Beebe-Ulffers Co., 103 Twelfth Street. Marshfield: Norton & Hanson Stationery Co., 216 Front Street north. Portland: The Beebe Co., First and Washington Streets.
Washington—Aberdeen: Evans Drug Co. Anacortes: S. D. Temple & Co., 610 Commercial Avenue. Bellingham: Edward T. Mathes. Blaine: Loomis Store Co. Everett: Adam Hill, 2929 Colby Avenue. Friday Harbor: L. E. Tierney, Customhouse. La Conner: Albert Piro. Olympia: Winstanley & Blankenship. Port Townsend: W. J. Fritz, 320 Water Street. Seattle: Coast and Geodetic Survey field station, 202 Burke Building. Lowman & Hanford Co., 616 First Avenue. Max Kuner Co., 804 First Avenue. Pacific Net & Twine Co., 1213 Western Avenue. Tacoma: M. R. Martin & Co. (Inc.), 926 Pacific Avenue.
Alaska—Anchorage: Z. J. Loussac's Drug Stores. Cordova: Northern Drug Co. Craig: C. E. Hibbs & Co. Haines: N. G. Hanson. Hoonah: O. G. Hillman. Juneau: The Old Post Office Store. Ketchikan: Ryus Drug Co. Kodiak: W. J. Erskine Co. Petersburg: The Trading Union (Inc.) Seward: The Seward News Co. Sitka: Chas. M. McGrath. Valdez: Valdez Drug Co. (Inc.). Grangell: F. Matheson's estate.
Hawaii—Honolulu: Hawaiian News Co.
Philippine Islands—Cebu: Pacific Commercial Co. Iloilo: Hoskyn & Co. Manila: Coast and Geodetic Survey field station, Intendencia Building, and Luzon Stevedoring Co., water front, foot of Calle Madrid. Zamboanga: Ohta Development Co.
Canada—Montreal, Quebec: Harrison & Co., 53 Metcalfe Street. Prince Rupert, B. C.: McRae Brothers (Ltd.). Vancouver, B. C.: The Clarke & Stuart Co. (Ltd.), 550 Seymour Street. Victoria, B. C.: T. N. Hibben & Co.
Ohio—Cleveland: The Upson-Walton Co., 1294 West Eleventh Street.
Illinois—Chicago: Denoyer-Geppert Co., 460 East Ohio Street. Rand, McNally & Co., 168 Adams Street.

FIELD STATIONS OF THE COAST AND GEODETIC SURVEY

Boston, Mass., room 1806, customhouse.
New York, N. Y., room 503, customhouse.
New Orleans, La., room 314, customhouse.
San Francisco, Calif., room 310, customhouse.
Seattle, Wash., room 202, Burke Building.
Manila, P. I., Intendencia Building.

At these offices complete files of United States Coast and Geodetic Survey charts, Coast Pilots, Tide Tables, and other publications relating to navigation may be consulted and information affecting navigation obtained without charge.

Notices to Mariners are kept for free distribution.

BRANCH HYDROGRAPHIC OFFICES, NAVY DEPARTMENT.

Baltimore, Md., room 123, customhouse.
Boston, Mass., 14th floor, customhouse.
Buffalo, N. Y., room 340, post-office building.
Chicago, Ill., room 531, post-office building.
Cleveland, Ohio, room 406-408, Federal Building.
Duluth, Minn., room 1000, Torrey Building.
Galveston, Tex., room 301, customhouse.
New Orleans, La., room 215, customhouse.
New York, N. Y., room 301, Maritime Exchange, 78-80 Broad Street.
Norfolk, Va., room 2, customhouse.
Philadelphia, Pa., main floor, The Bourse Building.
Portland, Ore., room 407, customhouse.
San Francisco, Calif., Merchants Exchange.
Sault Ste. Marie, Mich., room 10, Federal Building.
Savannah, Ga., second floor, customhouse.
Seattle, Wash., room 408, Lowman Building.

The Caille Aristocrat

The little 14-h.p. Aristocrat motor, which was shown by the Caille Perfection Motor Co. of Detroit at the recent Motor Boat Show in New York, is just about the same as it has been in previous years. It is furnished this year with complete Northeast electrical starting equipment and Willard storage battery. The ignition is by Bosch high tension magneto while the reverse gear is made integral with the motor itself. An instrument board to which all controls are carried is a feature of the machine. A boat powered with this motor can be driven in the same manner as a high grade car.

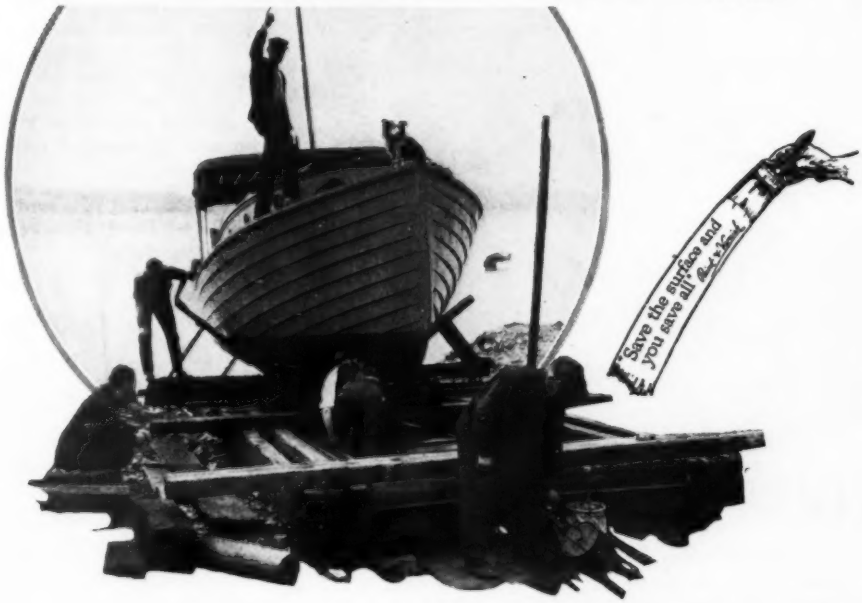
Advertising Index will be found on page 134

Varnish and *"Save the Surface"* of Motor Boats—Yachts—Canoes

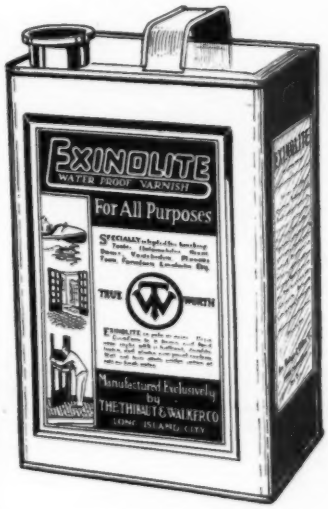
with **EXINOLITE**
WATER PROOF VARNISH

Protects the Surface from Corrosive Effects Caused by Salt Air and Water

An Ideal Varnish for Exterior and Interior work Where a Water Proof Surface is Necessary



Put up in Cans of
5 Gallons
1 Gallon
½ Gallon
1 Quart
1 Pint
½ Pint



Boat Builders Use Ex-in-o-lite
It Is Mar-proof and Water-Proof

Imparts a beautiful, artistic lustre of lasting durability, forms a protecting elastic coat over the surface and will give your boat a light, well groomed appearance. The quality is absolutely guaranteed and the price is very reasonable. In Gallon can. **$4.75 Per Gal.**

Ex-in-o-lite Varnish Stain
Made in six serviceable shades:
LIGHT OAK, MAHOGANY, DARK OAK, CHERRY, WALNUT, ROSEWOOD.
Stains and Varnishes at the Same Time producing a brilliant, lasting finish. In Gallon can.....**$4.75**

Ex-in-o-lite White Enamel
Works out freely, never shows laps, possesses extraordinary covering properties. Remains white, dries quickly with a rich gloss. Practical and Economical. In Gallon can.....**$7.00**

THE THIBAUT & WALKER CO.
40 years manufacturers of Varnishes of Quality LONG ISLAND CITY, NEW YORK

USE THIS COUPON

THE THIBAUT & WALKER CO
LONG ISLAND CITY, NEW YORK
Please send by Parcel Post, Express, or through your Dealer.

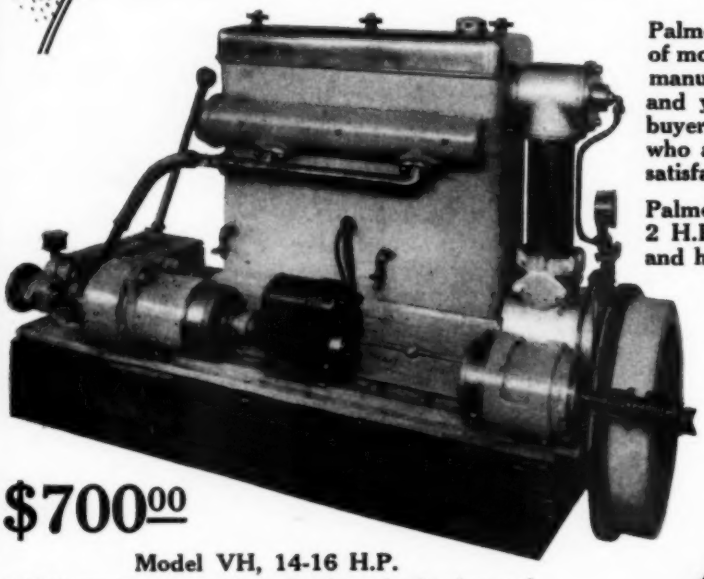
CHECK ITEM
- ☐ Ex-in-o-lite Varnish Clear....Quantity.....
- ☐ Ex-in-o-lite White Enamel....Quantity.....
- ☐ Ex-in-o-lite Varnish Stain (give shade)....Quantity..

Name .....
Street .....
Town..... State.....

PALMER ENGINES

TRADE MARK REG. U.S. PAT. OFF.

Guaranteed by More Than 25 Years of Service

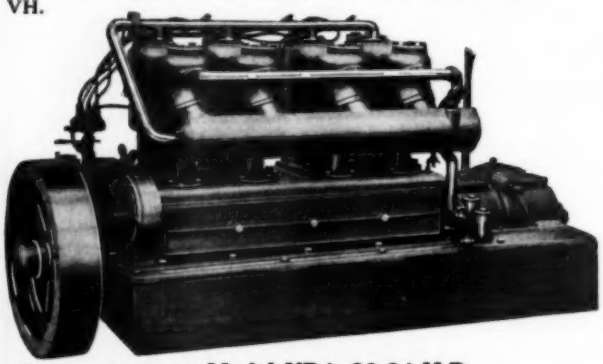


$700.00

Model VH, 14-16 H.P.

A high speed engine with enclosed overhead valves and overhead camshaft. Equipped with starter, generator, battery, high tension magneto, jump spark ignition. Four cylinders, cast en bloc.

There isn't a handsomer, smoother running or more up-to-date engine on the market than the Palmer Model VH.



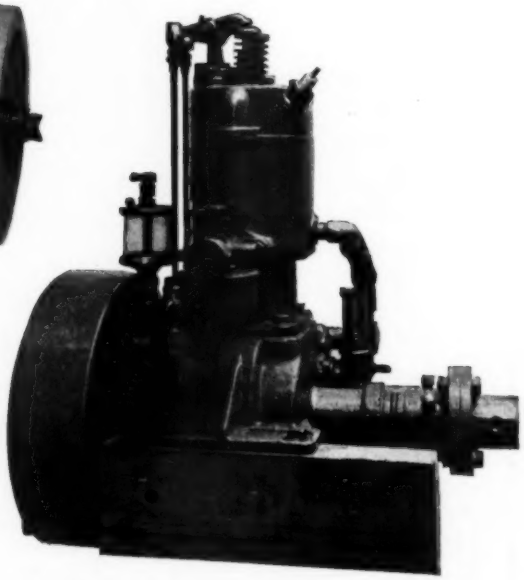
$775.00 **Model NR4, 20-24 H.P.**

The most popular medium duty motor.

Model NR3, 15-18 H.P.....$600
Model NR2, 10-12 H.P.....$425

Palmer Engines are reaping the reward of more than a quarter century of honest manufacturing and fair dealing. Year in, and year out, Palmer popularity grows as new buyers are added to the hundreds of boatmen who are operating Palmer Engines with supreme satisfaction.

Palmer Engines are built for every type of boat, 2 H.P. to 80 H.P. High speed, medium duty and heavy duty.



$98.00 **Model YT, 2 H.P.**

A four cycle valve-in-head motor designed especially for yacht tenders and other small boats. Weight 95 lbs.

The Palmer NR2, 10-12 H.P., has been selected for standard equipment in the 26 ft. shoal draft runabout built by American Balsa Co., Long Island City, New York. Experienced boat builders know that the Palmer Engine delivers maximum power and satisfaction at minimum cost.

Write today for latest catalog.

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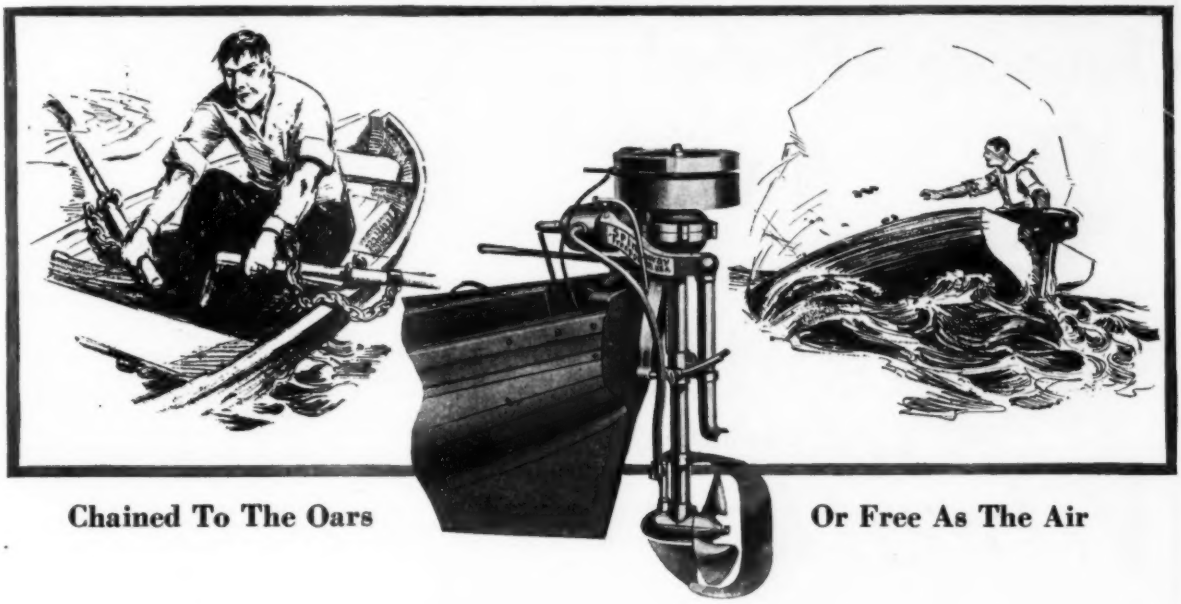
Advertising Index will be found on page 134



Chained To The Oars **Or Free As The Air**

In Which Boat Will You Be This Summer?

ROWING hasn't changed much since the time of the old Roman Galleys when they used to chain slaves to the oars.

Nowadays, there's no longer an excuse for being a galley slave; not when the SPINAWAY Outboard Motor is ready to pick up the burden.

This year will be the biggest ever for the use of Outboard Motors, and May is the month when thousands of boat owners will break the shackles that bind them to their oars and limit boating pleasure. When you get ready to break *yours*, be sure you select the motor that delivers *dependable* power.

SPINAWAY owners, everywhere, will tell you that the big point in favor of the SPINAWAY is its dependability—regularity of action and freedom from trouble for season after season.

On the Specifications Sheet which we will send you, you'll find this guarantee: *"Our obligation to Spinaway owners does not stop when the motor is shipped. We unreservedly guarantee Spinaway performance and stand solidly behind every detail of its make-up. The moral obligation of our Company is behind every revolution of the fly-wheel. In character of construction and in perfection of mechanical adjustment, the Spinaway Motor is approached only in the very finest marine engines."*

Isn't that a good assurance to have when you start out for a day's fishing? Isn't it worth-while to have *confidence* in your motor when the water is rough and you need every fraction of uninterrupted power?

Spinaway Detachable Rowboat Motor

The Motor That Puts the Ting in Boating.

SPINAWAY design gives you every wanted feature for convenience and safety in handling. Battery type or built-in-reversible magneto. Carburetor needs no adjustment for varying speeds. Tank holds fuel for five hours' use. Underwater exhaust. Disappearing crank handle. Water pump keeps cylinder cool on hottest days. Self-locking tiller, leaving hands free. Automatic tilting arrangement. Finish, moss green, bronze and highly polished aluminum.

Let us send you the Specifications Sheet, which includes sectional blue-print. An interesting catalog goes with it. With these before you, the proof is conclusive that the SPINAWAY is the Outboard Motor of guaranteed dependability.

Spinaway Boat Motor Co.

OWNED AND CONTROLLED BY HOEFER MFG. CO.

300 So. Chicago Ave. **Freeport, Ill.**

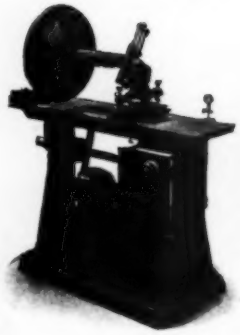
Balancing the Flywheel

on an

NWA Balancing Machine

aids materially in Eliminating

Vibration



Cut illustrates the flywheel of Rainbow I, being balanced in our laboratory, prior to entry of this boat in the Detroit Fisher Trophy Races. Necessarily, the crankshaft also was balanced.

This service should be given every boat purchaser by the engine builder.

VIBRATION SPECIALTY COMPANY

N. W. Akimoff, President

Harrison Bldg. **Philadelphia, Pa.**

SKANEATELES BOAT and CANOE CO.

ESTABLISHED **1893**

Boats that will last!

Row Boats, St. Lawrence Skiffs, Outboard Motor Boats, Sail Boats, Yacht Tenders.

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38 JORDAN ST. **SKANEATELES, N. Y.**

The Deckhouse a Necessity

(*Continued from page* 20)

scientific manner in which the many plies are related, as to thickness, kind of wood and direction of grain, and by the great pressure that is used in assembling. The Forest Products Laboratory has shown by tests that this plywood is stronger than steel of the same weight. Thus we find a material admirably adapted to deckhouse construction for the average power boat.

The deckhouse shown in the accompanying drawings and photographs was built on the 60-foot yacht Kex and went through a season of such rigorous cruising as to prove its merit. It flew in the face of the orthodox design and brought forth sarcasm from my boat carpenters, but it stopped a lot of solid water in the Bay of Fundy, lived through a month of Maine fog, resisted another month of hot sunshine at Marblehead and now at the tail end of a winter standing in a zero boathouse it is just as solid and tight as the day she went overboard.

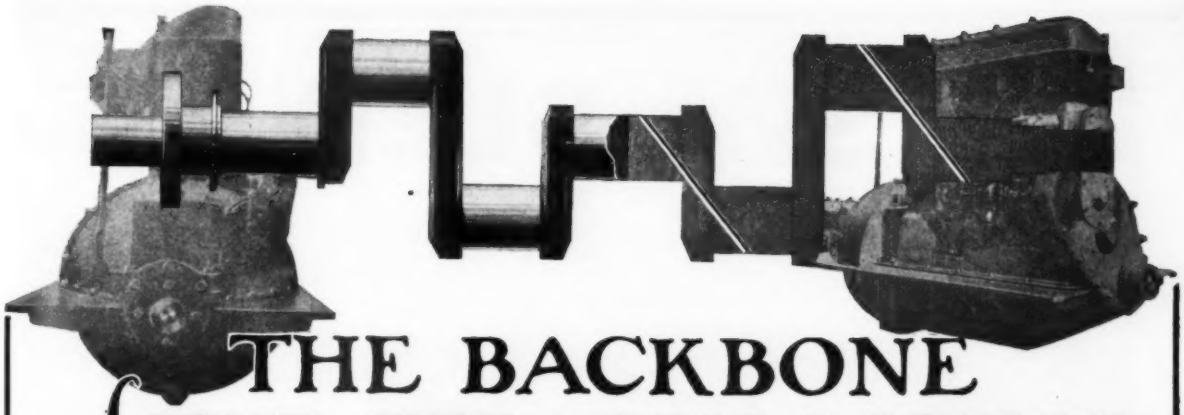
Not the least important factor is to get wood in the right condition. Did anyone ever hear of anything shrinking in a boat? Methinks I hear a chorus of groans from you who have pulled the knobs off trying to open a locker door. I never yet met a boatbuilder who wasn't nuts on dry lumber. If they would only go to sea in some of the boats they build and spend half a summer planing off doors, drawers and hatches, they would have a change of heart in favor of air-dried stock. I used the wettest mahogany I could lay hands on and it hasn't started to shrink yet. The drawings give a pretty good idea of the layout. The principal member is a vertical mullion. It is bolted to the deck as shown in Figure 3 and is spaced on 2-foot 5-inch centers. It is grooved out to carry the inner and outer plywood panels. The whole affair is manufactured like a sectional office partition. The outer panels are permanently set in the mullions with marine glue. The inner panel is removable and the sash drops down between them as shown in Figure 1. Horizontal joints that retain water were almost entirely obviated in this design. Another bit of heresy was the sash. The old method was to put the glass in a frame that swelled until you couldn't move it with a crowbar. Then you were expected to jump it up over the sill to shut it. When opened it dropped into a sheet metal lined watertight ? pocket. This was one of life's little jokes for they were seldom watertight and they usually irrigated somebody's bald head or the spark plugs down below. Well anyway we dispensed with the frame—figured plate glass would not swell. We put it in a groove to have vertical motion only and let all the water run down by the sill that wanted to. Then we heated up a wash boiler full of paraffin and swabbed the whole inside of the pocket, between the panels, sizzling hot. This drove the paraffin deep into the pores of the wood and filled up every joint and crevice. A path for the water to get out was made by boring a scupper through Q.

We fitted a stout fabric strap to control the window a la closed car. Figure 2 shows the fitting that was cemented to the bottom of the glass with melted alum. If you think alum is only good for cankers, try it the next time you want to stick metal to glass. It is great stuff but don't get it too hot or it sort of turns to sugar. The strap has three brass grommets to fit over the knob J in the figure. To head off the boob who unhooks the strap and lets the window drop we put in a heavy rubber bumper shown at R, bolted through the two panels. This also puts a damper on drumming due to sympathetic vibration.

The roof is built as a separate assembly so as to be removable as a whole in case it is necessary to remove the power plant. It is extremely light, fitting down over the sides and ends of the deckhouse with a watertight rabbet at E. The sharp curves on the edges are built up on natural hackmatack knees ¼ inch thick, 5-inch radius and spaced about 8 inches on centers. The carlins of clear spruce ½ by 1 inch are screwed to the knees. The roof is covered with clear white pine 3/16 inches thick with unbleached cotton laid in white lead brought down under the half round D. The underside or ceiling of the roof is lined with unbleached cotton, tacked on and painted a pale sky-blue. This is not only restful to the eye, but absorbs sound and makes the deckhouse very quiet. I might add that when we put in this lining we mobilized our friends who drove the one million odd tiny tacks required. Some swallowed them, others pounded their thumbs to a thick paste and others got such a crook in their necks that to this day they fail to recognize us in the street. You will note from the photograph of the interior that brass stanchions run from deck to roof, to insure rigidity as well as to provide excellent hand-holds in a seaway. These stanchions also carry the wires for the horn, searchlight and running lights located on the roof. Hinged screens to cover some of the windows when open to the first position are normally hooked up to the ceiling out of the way.

(*Continued on page* 108)

Advertising Index will be found on page 134



THE BACKBONE of THE STEARNS MOTOR

THE HEAVY CRANKSHAFT IN THE STEARNS—the backbone of the motor—is a chrome nickel steel forging carefully heat treated to insure uniform hardness throughout. It is unusually large for a motor of its size. As installed it weighs 165 lbs.

FREEDOM FROM BEARING TROUBLE IS ASSURED—frequent adjustment of bearings is eliminated in the Stearns. The exceedingly large bearings insure long life in even the most continually severe service. We believe the largest bearing areas ever incorporated in motors of similar horse power rating are found in all Stearns motors. The main bearings in the M.D. motor are 2⅞" x 4½"—the crankpin bearings 2¾" x 3¾".

PERFECT BALANCE IS OBTAINED—periodic vibration is absolutely eliminated in this crankshaft. No guessing—no experimenting is tolerated. Every shaft is put in perfect static and dynamic balance on Norton Balancing machines. This contributes to the smooth, vibrationless operation of Stearns motors and their velvet-like acceleration under even the heaviest loads.

You want power—dependability—all around satisfaction in a marine motor!—everyone does. Complete details regarding Stearns motors will exceed your expectations—you will become enthusiastic when you obtain our PRICES—THE LOWEST EVER QUOTED for engines of similar character. Inquire today.

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Stearns Motors are made in 4 sizes: 20 H.P. to 100 H.P., 400 to 1600 R.P.M. Full force feed lubricating system.

THE STEARNS EXTRA RESERVE MOTOR

Bosch starting, lighting and ignition system. Stromberg carburetor. Snow and Petrelli reverse gear

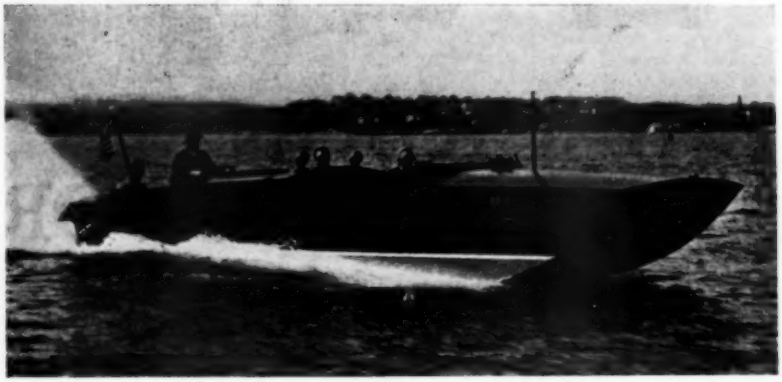
STEARNS MOTOR MFG. CO. **LUDINGTON, MICH.**

Inverted V-bottom and Surface Propeller Boats.

SEA SLED

Hickman Patents in all countries.

Trade Mark Reg. U. S. Pat. Off. Trade Mark Reg. Canada.



Marathon, the 30-ft. Sea Sled runabout owned by Mr. Henry B. Plant, of New London, and used by him for fast ferry service to New York and Long Island. After 4500 miles of high speed service, carrying up to twelve passengers at 30 to 31 knots, Marathon was taken out of the water and exhibited at the New York Motor Boat Show without even refinishing the hull.

Sea Sled Advantages Are Fundamental

SEA SLED exploits have been so spectacular that many popular misconceptions exist as to what the Sea Sled is and what it does. It is *not* essentially a racing boat although it has been more successful than any other racing boat, power for power, and weight for weight. It is not a stunt boat even though its performances have never been approached by any boat of conventional design.

The Sea Sled is primarily a new form of hull that has revolutionized the centuries-old principles of naval architecture. At the same time it has revolutionized nearly every known standard of motor boat performance. Its advantages are so many, so important, so fundamental, that its value cannot be judged by your experience with hulls of ordinary form.

Better Seaworthiness and Safety
Higher Efficiency per Horsepower
More Comfort in Smooth Riding
Freedom from Flying Spray
Shallow Draft at All Speeds
Large Passenger and Weight Carrying Capacity
Greater Stability for Its Size
High Speeds for Practical Purposes

It is impossible to more than suggest Sea Sled advantages in so short a summary. These principles have been successfully applied to Sleds of all sizes and types, from the 8 ft. Sea Sled dinghies to the big four-engine Sea Sled Cruiser now being completed for Mr. Henry B. Plant. Practical and successful boats of many intermediate sizes have been built and thousands of dollars worth of experimental work have resulted in the perfection of the present day Sea Sleds.

Let us tell you what a Sea Sled will do and what it costs to build in the size and type of boat in which you are interested

The Sea Sled Company, Ltd., West Mystic, Conn., U. S. A.

Sea Sled Dinghies are built in three sizes—8, 11, and 13 ft. long. Their particular advantages are ability to tow at high speed without capsizing or throwing spray, easy rowing and towing, large passenger capacity, roominess and great stability. The 11-foot Dinghy easily carries nine persons weighing 1500 lbs. Adapted for outboard motors. Write for Special Bulletin.
Designed and Patented by Albert Hickman.

Advertising Index will be found on page 134

Off for Your Trip

With the lightest, handiest outboard motor you ever carried

Takes apart—Packs in handy case to go under Pullman seat

(11)

YOU want an outboard motor with other qualities besides power. You want light weight so you can carry it easily—so any member of your family can use it. You want simplicity and convenience in operation. You don't want to bother with lugging batteries. You want quick, easy starting, quiet, smooth running, freedom from vibration and noise and above all GUARANTEED durability. You get all these in the Johnson Twin Cylinder *plus* the added convenience of being the only outboard motor that can be carried in a handy case to go under a Pullman seat. Instead of a heavy cumbersome package that even the porter doesn't know what to do with, you carry your Johnson like a suitcase and slide it under the car seat.

WEIGHS ONLY 35 POUNDS

More Durable — Stronger — Longer Lived

No other outboard motor weighs so little or is so convenient and easy to carry. Yet with all these advantages no other motor can be expected to give so many years of service. It is so accurately balanced and correctly designed that it is almost vibrationless; won't shake itself to pieces, yet has unusual strength in every vital part. For example, no other outboard motor has case hardened crankshaft, drive shaft and propeller shaft. So far as we know no other has 3½% nickel steel heat-treated bevel gears. Bearings are extra large and of genuine phosphor bronze.

Be sure to see these and all the other superior advantages of the lightweight Johnson Two-Cylinder Motor for Rowboats and Canoes before you buy. Remember the Johnson has built in Quick Action Magneto, a real Float Feed Carburetor, Spark and Throttle Control like an auto, Instant Reverse which stops boat at full speed in its own length and self-tilting and self-righting propeller which beaches boat perfectly and drives through shallow waters or over obstructions. Write for Free Illustrated Folder Today.

For Canoes

We build a special Inboard Motor for Canoe Installation. Drives Canoe at Power Boat Speed. Balances perfectly. Absence of vibration prevents opening of seams.

JOHNSON MOTOR CO. : 860 Sample St., South Bend, Ind.

Dealers We have an interesting proposition for you. Write us.

Johnson

DETACHABLE MOTORS

For Boats and Canoes

"Built on the Banks of the St. Joe"

Short Cuts in Figuring

(*Continued from page 66*)

that when adding a log. taken from Table 44, our log. answers will always be 10 too great, and 10 must be deducted from the index. And in subtracting a log. function from another log. we may first have to add 10 to the index of the latter. In practice, this is done mentally. Thus to solve the dead reckoning problem above suggested:

Dist (362.4)	log.	2.55919
Sin Course (35°)	log.	9.75859 (add because multiplying)
Dep (207.9)	log.	2.31778 (drop 10 from index)

Had the course been 35° 45′, the log. sine would have been found in the same manner as in Table 41. That is, run down the M (minute) column at the left to 45, and opposite 45, in the Sine column, find the log. sine of 35° 45′, which is 9.76660. In Table 44, as in Table 41, and for the same reason heretofore explained, angles up to 45° are found at the top of the page, and for additional minutes we read down, using the left hand M column; while angles above 45° are found at the bottom of the page, and, for minutes, we read up, using the right hand M column. Also the names of the columns at the bottom are in reverse order from those at the top. Thus reading from the top down, the sine column is toward the left, while reading from the bottom up, the sine column is at the right.

Examples for practice:

Divide 367.3 by log. tangent 17°

367.3	log.	2.56502 (mentally add 10 to index)
Tan 17°	log.	9.48534 (deduct because dividing)
1,201.4	log.	3.07968

Multiply 3,621. by log. cosine 43°

3,621	log.	3.55883
Cos. 43°	log.	9.86413 (add because multiplying)
2,648.	log.	3.42296 (drop 10 from index)

Example 7. Multiply 126.4 by log. sin 59° 16′ (Ans. 108.7)
Example 8. 279.3 by log. tan 29° 29′ (Ans. 157.9)
Example 9. 2969 by log. cos 81° 40′ (Ans. 430.3)
Example 10. Divide 341.9 by log. sin 16° 39′ (Ans. 1193.0)
Example 11. 245 by log. cos 44° 44′ (Ans. 344.9)
Example 12. 16.4 by log. tan 57° 36′ (Ans. 10.4)

Addition, subtraction and division of arc. Probably the reader will recall how to handle quantities expressed in arc. But lest some one may have become rusty, we shall briefly illustrate the methods:

Example.

Add:	19°	26′	23″
	23°	39′	42″
Ans.	43°	06′	05″

First, adding the seconds, the total is 65″. But 60″ = 1′. Thus, 65″ = 1′ 05″. Set down the 5″, carry 1′ to the minutes column, and add. The total of minutes is 66′ = 1° 06′, as 60′ = 1°. Set down the 6′, and carry 1° to the degrees column, which then totals 43°.

Example.

Subtract:	87°	10′	29″
	63°	49′	57″
Ans.	23°	20′	32″

It being impossible to subtract 57″ from 29″, borrow 1′ = 60″ from the minutes column; thus making the seconds 89″. Then deduct 57″ from 89″, leaving 32″. You have 9′ left in the minutes column. Borrow 1° = 60′ from the degrees column, making the minutes 69′. Then deduct 49′, leaving 20′. 86° are left in the degrees column, from which deduct 63°, giving a remainder of 23°.

Example.

Divide:	2)173°	49′	22″
Ans.	86°	54′	41″

First, divide the degrees. The quotient is 86° with 1° = 60′ left over. Add the 60′ to the minutes, making their total 109′. Divide 109′, giving a quotient of 54′, with 1′ = 60″ left over. Add the 60″ to the seconds, making their total 82″. Divide, and the quotient is 41″.

Interpolation. It is recommended that the student solve the above problems, before studying what follows. He will thus have gained some idea of the scheme of Tables 42 and 44, and be better prepared to understand interpolation.

Interpolation in Table 42. This table gives the mantissae of all numbers consisting of 4 figures. But it may be used to find the logs. of 5 figure numbers. Supose the log. of 46,376 is desired. We have seen that changing the decimal point works no change in the mantissa. Suppose to facilitate explanation, we insert a decimal point, and call this number 4637.6. Now we can get the log. of 4637 and also of 4638, the next higher number. These are:

4637	log.	2.66624
4638	log.	2.66633
Difference		9

Thus a difference of 1 in the number, gives a tabular difference of 9. Then for .6 (the fifth figure of our number), the difference must be .6 × 9, or .54, which we may call 5. Thus the complete mantissa is .66624 + 5, or .66629. But the mantissa for 46,376 is the same. Thus the log. sought is 4.66629.

The logs. of 5 place numbers may always be found as follows:

Treat the 5th figure as a decimal,

Take out the mantissa for the first 4 figures, and the tabular difference between it and the next higher mantissa,

Multiply this tabular difference by the decimal (5th figure) and add the product to the mantissa of the first 4 figures.

In practice, it is unnecessary to make this multiplication, for little tables of proportional parts are printed at the right hand side of each page of Table 42, for every tabular difference appearing on the page. The above tabular difference was 9. Thus take the little right hand table headed 9. Opposite 6 in the first column (which stands for our 5th figure), find 5 in the second column, which is the amount to be added to the mantissa of our first 4 figures.

Conversely, we may have a log. answer which does not exactly match up with the mantissae in the table. Instead of taking the nearest mantissa and letting it go at that, we may wish to be a little more accurate. Suppose we have a log. answer of 3.28042, and want the number it stands for, or antilog. On p. 757 we find:

antilog	mantissa
1907.....	28035
1908.....	28058
Tab. diff. for 1.....	23

Now we have a mantissa which stands between the mantissae of 1907 and 1908. Our mantissa is 7 greater than the mantissa of 1907. The tabular difference for a whole unit, is 23. Therefore, our difference must be 7/23, or say .3, and the antilog sought is 1907.3. Again, instead of figuring it out, we can look in the little proportional part table at the right, headed 23, and against our difference of 7 in the second column (under 23), we read its value to be 3 in the left hand column, and this we set down as the fifth figure of our antilog. The process is just the reverse of what is done in finding the logs. for 5 figure numbers.

Examples:

Find the log. of 1268.1

p. 756	mantissa of 1268	=	.10312
	tab. diff. 34		
	diff. for .1	=	3
	log.	=	3.10315

Find the log. of 92294:

p. 769	mantissa of 9229	=	.96515
	tab. diff. 5		
	diff. for .4	=	2
	log.		4.96517

Find the log. of 36240

This is the same as for 3624, except the index is 4 instead of 3.

(*Continued on page 128*)

The Sea Imposes Special Problems

Recognizing that marine service conditions and requirements are fundamentally different from any other, the Westinghouse Marine Organization rigidly adheres to the policy of constant study and analysis of marine applications and close co-operation with Naval Architects, Marine Engineers and Ship Operators.

The work of the Westinghouse Marine Organization is exclusively marine.

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"America's Greatest Magazine"

SOMETHING good to read adds zest to any outing—but the deck or cabin of a boat, and COSMOPOLITAN, offer the best combination for real enjoyment you'll find anywhere. Cosmopolitan stories and articles are the best work of the best writers. At least 7 short stories, 3 serials, 2 articles, etc., in every issue of Cosmopolitan.

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The Financial Side

(*Continued from page* 19)

Do cruisers in northern waters know the sterling value of this citrus fruit? We, cruising in the Tropics, were lucky enough to have an unlimited supply of limes, the gifts of friends en route, and there were days on end when we went without tasting plain water. But even at the prices that are charged for limes in northern markets they are a wonderful investment, for they not only tone the blood and quickly quench the thirst, but they are unendingly delicious and make warm water palatable. Limeade with ice and a little something else is a drink for the gods, and when composed only of half a lime, two spoonfuls of sugar, and a glass of warm, boiled water, it is still good enough for the most exacting human being.

THE EDUCATED SAUSAGE

Our staple beverage being thus provided by the natives, we did not so greatly mourn the absence of a staple food. Every male, I suppose, who has to cook for himself, expects to ward off starvation by a liberal use of bacon and eggs. Certainly at the outset of Hippo's cruise we thought that this dish would be the mainstay of our existence. But as we worked down the coast and away from home waters we found that eggs were increasingly difficult to get, that they could not be guaranteed to remain fresh in an iceless larder, and that bacon becomes quickly populous in the warm countries. So, instead of a staple, bacon and eggs was a luxurious dish to be ordered when we ate ashore.

Having by necessity or choice eliminated three of the ingredients of the orthodox shore breakfast—coffee, eggs, and bacon—it might be supposed that we fell back on oatmeal as an article of morning diet. But there another complication arose. To be palatable, oatmeal must be cooked properly, and proper cooking of oatmeal involves extended use of the stove. This, in the Tropics, is something to be avoided, and would score heavily against oatmeal even if the kettle could be expected to watch itself in a seaway. After a few unpleasant episodes we crossed oatmeal from our daily bill of fare.

So long as we were in the States we ate voluminously of prepared breakfast foods, but corn flakes and shredded wheat are stale and expensive in foreign countries, and they are too bulky and perishable to be satisfactorily stored. So, for one reason or another, breakfast, as it is ordinarily known, ceased entirely to be a meal aboard Hippocampus.

If there is one article of food that could rightly be called a staple it was canned sausage in its various varieties. The humble frankfort or wienie through the skill of such a chef as Squibb becomes ambrosia for the modern Corinthian, and we ate it boiled or fried in the morning, and as an ingredient of stew in the evening. The kind of sausage known as Cambridge, which is canned with oatmeal for ready frying, makes an excellent occasional meal, but it is too rich for a constant diet. Nevertheless, for one entire week we ate practically nothing but this variety.

This happened on the run from Cienfuegos, Cuba, to Port Antonio, Jamaica, and came about through a slight error of Squibb's. He did the ordering at Cienfuegos, and although previously he had opened countless tins of wienies it had never occurred to him that there was a difference in sausage. In the beautiful words of Wordsworth—

"A sausage by a river's brim
A Cambridge sausage was to him,
And it was nothing more."

So, when in conclave Chambers and I mentioned that we would like half a dozen cans of Cambridge sausage and a dozen of the other, Squibb went ashore in ignorance of what the other kind was. The Cuban grocer from whom we ordered happened to have in stock two brands of Cambridge sausage between which there was no difference except that one was labelled Oxford.

Now, to the non-collegian like myself, Cambridge and Oxford seem to be almost the same institution, but to a college man there is a vast difference between the two universities, and Squibb assumed that there would be the same difference between sausages. Hence it was that wienies went unordered and we stocked up with six cans of Cambridge and a dozen of Oxford—and hence it is that I can't look at a cultivated Englishman without thinking of that ghastly run to Port Antonio. I shall never forget how upon our arrival my teeth sank into a portion of beefsteak that had been raised on a farm with no pretense to a higher education.

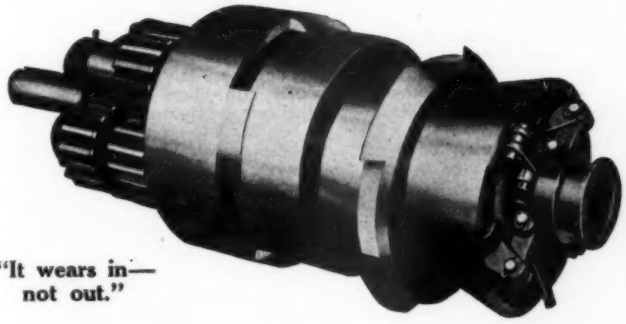
ONE EATS TO LIVE

Canned food of any kind would become tiresome if its preparation weren't capable of some variation. Corned bill, humble though it is, is good because it may be eaten cold or heated in the can or disguised by admixture of peas, beans, tomatoes, soup, or whatever cans happen to fall out of the locker when the door is opened. Served thus, and with potatoes and onions added, it becomes known as mulligan and is a dish for kings.

(*Continued on page* 102)

Advertising Index will be found on page 134

MULTI-CONE



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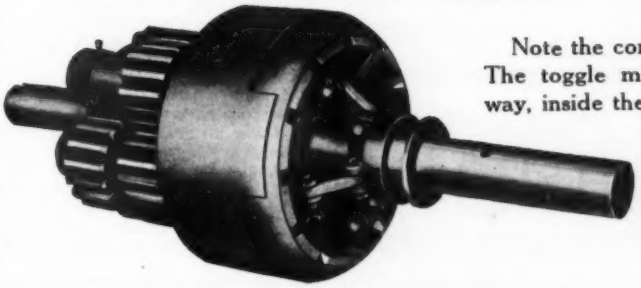
durable
trouble-proof
marine clutch

is used only in the

STANDARD

Reverse Gear

The secret of Multi-Cone efficiency lies not only in the great friction surfaces of the big cones, but in the fact that these surfaces are at the point of greatest diameter. This increases their leverage and thereby increases the holding power of the clutch.



Note the compactness of this clutch. The toggle mechanism is out of the way, inside the cones. The Multi-Cone picks up the load smoothly and releases instantly. Easy to adjust or take apart.

Model "C" Standard Multi-Cone
for

100 H.P. HALL-SCOTT

Entirely Enclosed

$100.00 COMPLETE

Write to-day for description and prices, giving complete details of your boat and engine so we can recommend the proper size gear for your outfit.

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Time to get under way with the final touches to insure a completely successful season on the water.

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For Topsides — Full and Semi-enamel Yacht white

Advice and consultation free on all painting and repair work.

STEARNS-McKAY MFG. CO

MARBLEHEAD MASS. U.S.A.

The Financial Side

(*Continued from page* 100)

If one can overcome his natural prejudice to canned roast beef it will be found more than palatable, while the ex-army product known as camp rations and composed of beef, carrots, potatoes, and tomatoes, will satisfy the most voracious appetite.

When all is said on the matter of yacht cuisine, the fact remains that afloat in a small boat a man eats to gratify his hunger rather than to titillate his palate. Eating is a function more than a pleasure, and because we recognize this fact nearly everything tastes good. One develops, however, a liking for sweets which becomes a craving. Chambers started the cruise with a gross of lollypops, the gift of a candy manufacturer, and for several days our shore habits clung to us so strongly that we thought of them with scorn and loathing. But when we discovered that hard candy speeds the watch, appeases the appetite, and freshens the taste for smoking, those lollypops melted like the snows of April.

Jam is even more desirable than candy, and by the time we had gotten well into our stride we were consuming it at the rate of two pounds a day. Whether it is strawberry or plum and whether real or synthetic makes little difference as long as it spreads thickly on hard crackers. Bread was an in-port luxury, but we bought ship's biscuit by the twenty-five-pound lot and always kept a water-tight tin in the cockpit. The jam pot and knife for spreading were hard by, and at all hours of the day and night the munching of crackers and jam went on.

The Mango Rash

Eating only two meals a day, but sampling incessantly between meals, I often wondered why our digestions didn't fail us on the hippocamping expedition. But only once did anything go awry. That was when, from eating mangoes in great quantity, Squibb and I developed the mango rash, which sounds like the title of a popular song.

Certain oldtimers in the Tropics have become so fed up on mangoes that they will eat only those which grow on a certain tree on a certain island. The tree and the island differ in different cases, but the implication of a highly developed, individual taste is the same in all. Luckily we were not so choosy. We recognized that there are good and bad mangoes just as there are good and bad apples, but we received thankfully and gratefully all the dozens that were given us and ate them in juicy contentment, rash or no rash.

Mangoes have their limitations, of course. They are best eaten in a bath tub, but we in our bathing suits and with plenty of water all around us fared pretty well. Other tropical fruits are more generally satisfying, and the old familiar banana is a godsend. It, like its humble relative the plantain (pronounced with broad *a* and a sharp upward inflection of the second syllable) is excellent fried, while when plucked from the stalk and eaten in quantities ranging from twelve to eighteen the banana not only soothes the appetite but stimulates the soul. Presented in Port Antonio with a stalk holding about 150 bananas, we kept them in an undevoured state for exactly three days.

The breadfruit, most famed of all tropical fruits, does not keep well, and so fails to be a cruising staple. But whenever we ate ashore in Jamaica I included this succulent food in my ration. Served baked or boiled as a vegetable it resembles in consistency and appearance the potato, but has a delicate flavor of its own. Many Northerners, failing to detect any flavor, would prefer to eat cotton, but I like it unreservedly.

The Mechanics of Cooking

Some men actually enjoy cooking, but they don't answer to any roll call of Chambers, Loomis, and Squibb. If there was one point on which we were habitually in accord it was our dislike of the culinary art; and we had not been at sea very long before we decided to count three meals a day as one too many. Consequently we ate at nine in the morning and again at about five in the afternoon, and rotated the galley watch. The man who cooked also washed up, for it was found that by this arrangement fewer dishes were used.

During the early part of the cruise we placed our reliance in a kerosene oil stove of the blue flame type which did pretty well in quiet water. In a seaway it showed an inclination to disintegrate when the mulligan had been successfully brought to within ten degrees of the boiling point, and this failing caused us considerable annoyance until the skill of Chambers was brought to bear on fastening it permanently together. Even so the pot on the stove was still a factor to be reckoned with, and I have sworn for minutes on end while bracing my head against the cabin hatch and holding on to bulkhead and stew kettle.

As we worked into the Tropics we practically dispensed with the oil stove and had recourse to a two-burner Theroz alcohol outfit which employed non-melting solidified alcohol. So satisfactory was our use of this stove that I believe canned heat to be the solution of the galley problem on boats too small to accommodate a range.

(*Continued on page* 108)

Advertising Index will be found on page 134

TOBIN BRONZE

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THERE is no question about the proper material to specify for the underwater parts of motor boats and yachts. This point has been settled to the satisfaction of leading naval architects, engineers and boat builders during more than 30 years' experience with Tobin Bronze.

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Tobin Bronze is manufactured solely by The American Brass Company.

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The plans contain outboard profile, lines, inboard, construction and interior arrangement plans, sectional views and complete table of offsets. Accompanying each design is a description of the boat and a full set of specifications taking up step by step each feature of the boat's construction, how it should be built and the proper material to use.

Plans and specifications of the following boats are included: **Edith, a 15-foot runabout; Jane, an 18-foot runabout; Katharine, a 30-foot cruiser; Dorothy, a 25-foot runabout; Zenith, a 25-foot cruiser; Cyclone, a 36-foot auxiliary; Eclipse, a 40-foot express cruiser; Magnet, a 28-foot cruiser; Tornado, a 45-foot auxiliary schooner; Broncho, a 29-foot cruising runabout; Shark, a 21-foot utility runabout; Claire, a 36-foot express cruiser.**

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Foreign Postage $1.50 extra.

(See advertisement of charts and log book elsewhere in this issue)

MoToR BoatinG, 119 West 40th Street, New York

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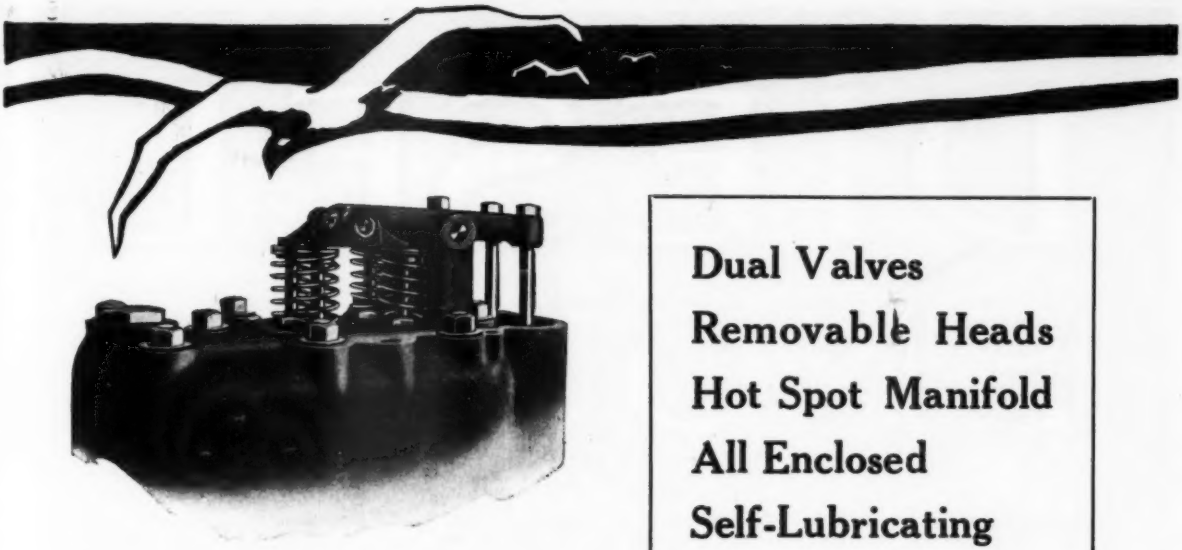

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Removable Heads
Hot Spot Manifold
All Enclosed
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Dual Valves

A Cleaner Engine More Power

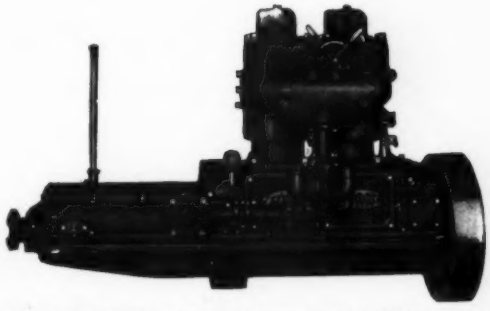
ONE of the important points of the new Model T line is the dual valve construction. There are **two** exhaust valves and **two** intake valves in each cylinder head. This means a quicker, cleaner exhaust and a more rapid intake of fuel.

Three sizes: 2 cylinder 20 H.P., 4 cylinder, 50 H.P., medium speed; and 4 cylinder, 100 H.P., high speed.

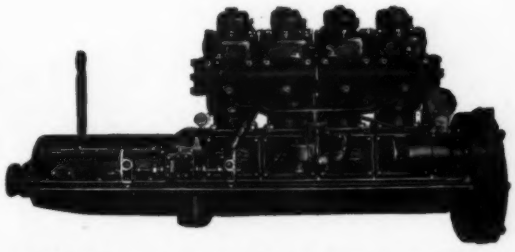
Special literature on these new motors, name of nearest dealer and catalog of the regular "friendly" Frisbie line, 5 to 75 H.P., gladly sent on request.

The Frisbie Motor Company
7 College St., Middletown, Conn.

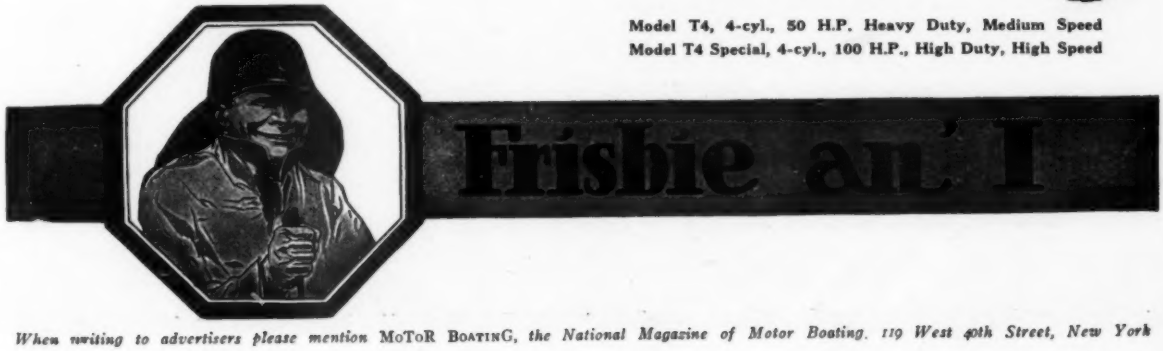
Frisbie VALVE-IN-HEAD MOTOR



Model T2, 2-cyl., 20 H.P. Heavy Duty, Medium Speed



Model T4, 4-cyl., 50 H.P. Heavy Duty, Medium Speed
Model T4 Special, 4-cyl., 100 H.P., High Duty, High Speed



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IDEALIA, 84′ x 14′ x 3′, is powered with a 120 H.P. NELSECO Diesel engine which drives her 14¼ miles per hour, using only six gallons of fuel oil per hour. It would take 15 gallons of gasoline to produce the same power, *at approximately ten times the cost.*

Everyone concedes the advantages of Diesel engines for commercial boats. The case of Idealia and other successful installations prove that NELSECO engines are equally suitable for substantial pleasure yachts and large cruisers.

The broad experience of this company, the first to build a Diesel Engine in America for marine use, is at the disposal of those who are interested in investigating or planning a Diesel powered boat. Our engineers will take pleasure in working out your power problem if you will put it up to them. 120 B.H.P. to 3400 I.H.P.—over 150,000 B.H.P. in use or on order.

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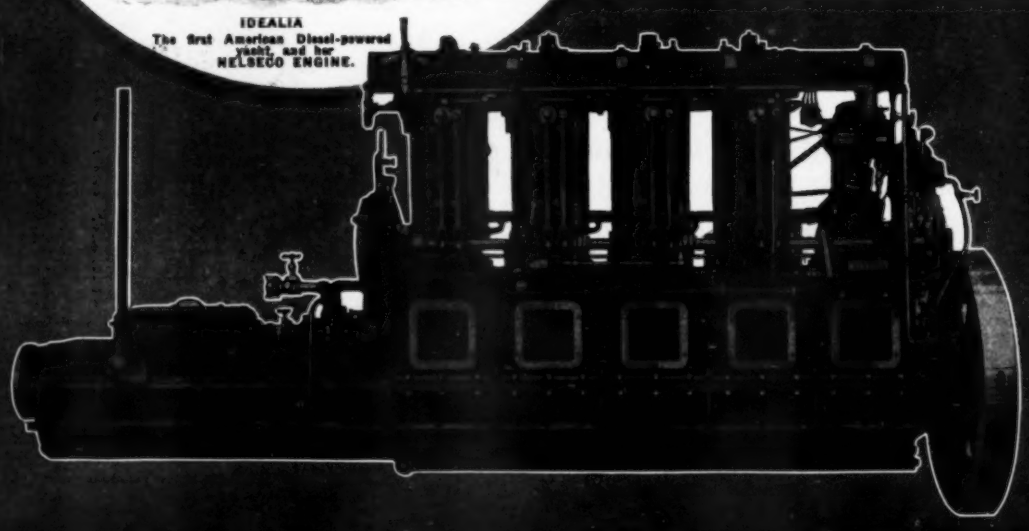
IDEALIA
The first American Diesel-powered yacht, and her NELSECO ENGINE.



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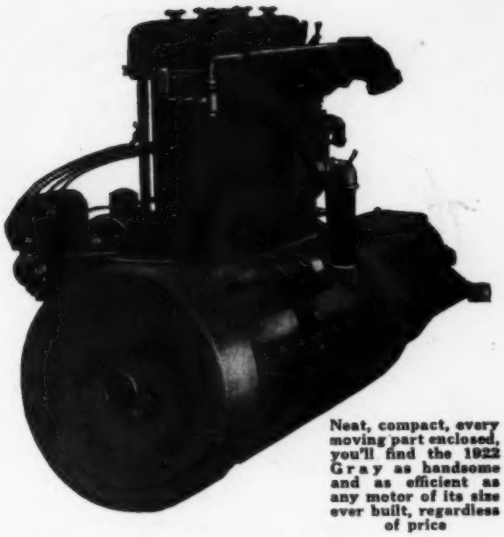
A Better Engine for Your Boat

A STRICTLY DESIGNED MARINE TYPE

THE 1922 Gray is neat in appearance, compact, and can easily and inexpensively be installed in runabouts 20 to 30 ft. in length; small cruisers up to 34 ft., also work boats.

Note the rigid one-piece base with Reverse Gear enclosed. The gear is automatically lubricated with positive gear pump that lubricates all other internal working parts of the engine—no grease cups or thick transmission oil used.



Neat, compact, every moving part enclosed, you'll find the 1922 Gray as handsome and as efficient as any motor of its size ever built, regardless of price

The splash lubrication is supplemented by force feed pump lubrication to all moving parts

Oil filler is conveniently located on *top of engine* with duct leading to Crank Case. Rocker arm shaft is hollow and automatically supplies oil to Rocker Arms. Oil is forced under pressure to the three main bearings, and to the connecting rod troughs.

In brief, the Gray Oiling System leaves nothing to chance. It is unfailing at all engine speeds, and all oil is kept inside the engine, and not thrown around the boat or on its occupants.

The fly wheel is enclosed, affording safety and cleanliness. Bilge water cannot be thrown by the fly wheel. Every working part is enclosed; even the push rods. Due to the special design of the Cam Shaft, push rods and rocker arms, scarcely a sound can be heard with ear close to the engine.

The smooth, quiet operation of the new Gray improved Valve-in-Head at all speeds from 200 to 2000 would compare favorably to an electric motor. It runs most economically on low grade gasoline and satisfactorily on kerosene.

Note The Big Crankshaft

The diameter of the main bearings are: Front 2⅛". Center 2 1/16". Rear 2". The lengths are 3¾", 2½", 2½" respectively. Crankshaft is 40-50 point carbon steel forging, heat treated and ground.

Special attention is given to the balancing. The shaft is put in rotative as well as static balance on an Akimoff Dynamic Balance Machine, reducing vibration to a minimum.

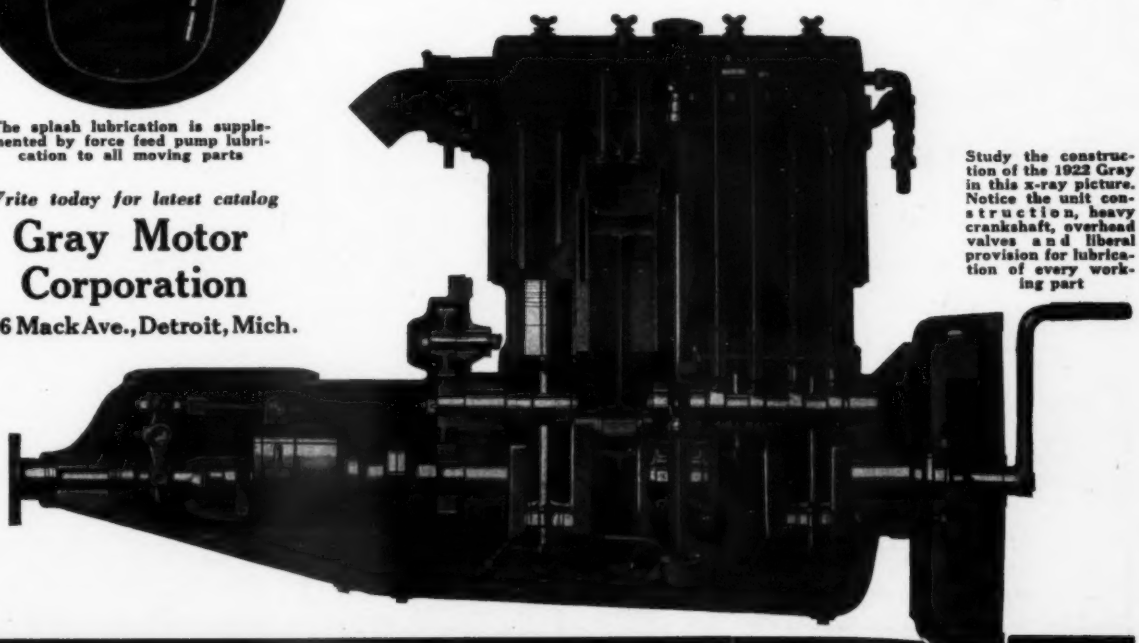
Bosch Magneto with Impulse Starter, also Bosch two unit Starter and Generator is used.

Gray Two-Cycle Motors are built in models from 3 to 8 h.p.

Write today for latest catalog

Gray Motor Corporation

2106 Mack Ave., Detroit, Mich.



Study the construction of the 1922 Gray in this x-ray picture. Notice the unit construction, heavy crankshaft, overhead valves and liberal provision for lubrication of every working part

Let the

BOYCE MOTO METER

watch your hidden motor

It reveals instantly weeds in the water-inlet, a clogged pump and other causes of overheating damage.

It enables you to regulate your motor temperature to secure maximum gasoline mileage.

Price $18.00

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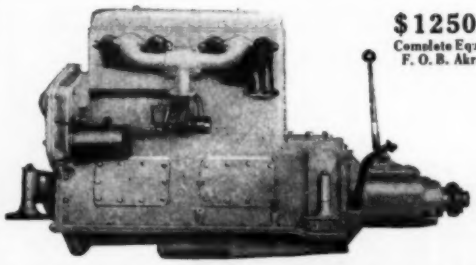

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Complete Equipment
F. O. B. Akron O.

The Wellman-Seaver-Morgan Co.'s

J. V. B.

A Marine Motor of Unusual Merit

Ten Superior Features

"Before You Invest, Investigate"

This is a marvelously efficient and smooth running motor with all the useful refinements. Removable cylinder sleeves. Reverse gear has positive neutral.

Sold by THE J. V. B. ENGINE CO.,
196 Kenmore Blvd. Akron, Ohio

Built by the Wellman-Seaver-Morgan Co., Cleveland, Ohio

SEND FOR BULLETIN

The Financial Side

(*Continued from page* 102)

INCIDENTAL EXPENSES

While this article has been mainly concerned with eating expenses and the business of cooking, the lump sum of $425 entered upon the ship's budget for the cruise also included items pertaining to maintenance of Hippocampus, exclusive of the bill for damages sustained when we were rocked at Mayport, Fla. I blushingly draw a veil over that repair charge, and itemize some of the incidentals. Thus, for paint and varnish bought en route we spent $6.75; for renewals to our running rigging, $4.86; for health clearance papers, $8; for Panama Canal toll, $4.50; for fresh water, $2, and so on.

The item of $4.86 for running rigging deserves some comment, for it would have been larger if Chambers hadn't been a natural born go-getter. He rarely lost an opportunity to wheedle small stuff from obliging ship captains, and his persuasive ways saved us many a penny. On the other hand, the bill, small as it was, would have been still smaller if we hadn't been excessively particular about the condition of our sheets and halliards. As soon as they commenced to show the slightest wear in reaving parts we reversed them and when they wore again we discarded them altogether. Old main halliards were used sometimes as jib sheets or backstay runners, but in the West Indies I saw many a main sheet on native craft that had less life in it than line that we had cut up for fenders. As recompense for our extravagance in this respect, we never experienced the embarrassment or danger of having sheet or halliard let go.

While still on the topic of maintenance I should like to go a little out of my way to speak of dry cells. Having no magneto on our engine we derived our ignition current solely from this source, and when we took possession of Hippocampus in the spring we found aboard her an eight-cell Columbia Hot Shot dry battery. As a relief outfit we set up a rack with individual dry cells on it, but the Hot Shot, which had been used for part of the season of 1920, lasted us through 1921, and fired the last charge when I motored Hippo out to her mooring in Gatun Lake in September. Thus, our battery expense was almost nil.

A LIST OF EDIBLES

Believing that it may be of some slight assistance to motor boatmen who are now laying plans for summer cruises, I conclude with a list of the groceries which Hippocampus had aboard her at the outset of the cruise. Others will no doubt find it incomplete, and we ourselves found it desirable in replenishing stores not to adhere too closely to this list; but it served its purpose—that of providing a full month's supply of edibles.

10 pounds of sugar	6 cans of apricots
4 pounds salt	6 cans of pears
1 can pepper	6 cans of pineapple
25 pounds hard crackers	6 cans of peaches
1 can of tea	1 can Wesson oil
2 pounds of coffee	3 cans corned beef
1 can of cocoa	3 cans luncheon beet
3 Grape Nuts	2 jars sliced bacon
3 Corn Flakes	3 jars of smoked beef
3 Shredded Wheat	3 pounds of bulk bacon
1 Oatmeal	6 cans Vienna sausage
2 Wheatena	6 cans lima beans
2 Flapjack flour	6 cans string beans
1 baking powder	6 cans corn
7 pounds of flour	6 cans succotash
5 one-pound tins butter	12 cans baked beans
5 pounds of prunes	6 cans peas
1 bottle Worcestershire	24 cans assorted soups
1 jar of mustard	24 cans milk
6 cans of salmon	5 pounds potatoes
6 cans of tuna	2 pounds onions
6 cans of sardines	6 bars of naphtha soap
2 cans clam chowder	

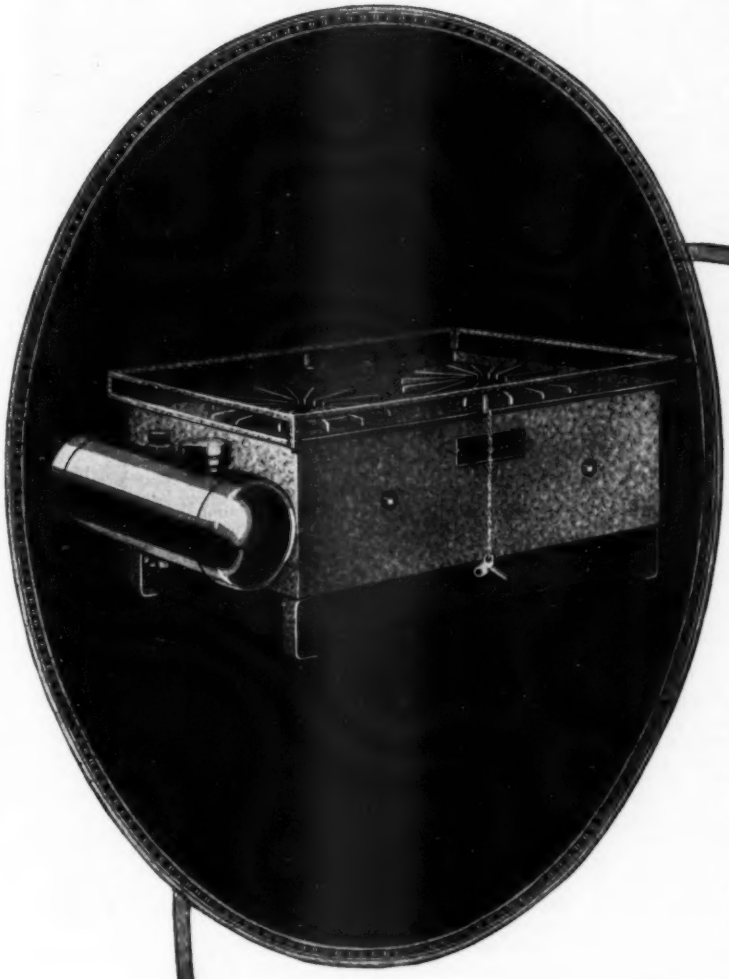
The Deckhouse a Necessity

(*Continued from page* 94)

A deckhouse of this type of construction may be built onto most any able-bodied cruiser over 40-feet long without adversely affecting her stability. In the case of Kex it permitted access from one end of the ship to the other without going out into the weather and at the same time left her divided into three watertight compartments with two non-communicating bulkheads below decks. The whole outfit, 7-feet by 14-feet 6-inches, cost in the neighborhood of $800.00 The plywood panels are not prohibitively expensive. A number of manufacturers make them. I bought mine of the Haskelite Corporation, Chicago. The plate glass was the most expensive item around $150.00.

I don't care how well you like the spray in your whiskers, the deckhouse is the thing. You can get the spray by dropping the front windows. You can keep out the solid water by closing them. You can run in lots worse weather and not be washed overboard. You can get a little air on a rainy day at anchor without the shower bath. Your wife will like it if you don't and you won't be able to keep your friends ashore.

Advertising Index will be found on page 134



Specifications:

Size, 20¼" x 10½" x 5⅛"; legs 2" high; body made of galvanized iron, strongly riveted; all fittings galvanized or of copper or brass; tank made of brass, carefully tested; has rail around top to prevent utensils from sliding off. Burns ordinary motor gasoline—gives a steady hot blue flame that a thirty mile wind can not blow out. Equipped with a full sheet of galvanized iron for covering of table or bench on which stove is mounted. Has slots for legs to fit into. Pump and funnel with each stove.

Price, complete, $20.00

If desired, Auto Galley Kook Kit can be furnished with the tank separate from the stove, and equipped with 15 feet of copper tubing so the tank can be mounted on deck.

Price, complete with 3 gal. tank, 10" pump.....$32.50

Price, complete with 1 gal. tank, small pump....$27.50

GALLEY Auto KOOK KIT

TRADE MARK

FOR *YOUR* BOAT

An efficient, safe, reliable stove for every galley—built especially for marine use—occupies minimum space—economical to operate—burns ordinary motor gasoline—gives a hot steady blue flame that a thirty-mile wind cannot blow out.

Special sizes can be made up with any number of burners, if desired. Send us a blueprint of your galley and we will gladly submit an estimate.

Prentiss-Wabers Stove Co.

108 Spring St.
Wisconsin Rapids,
Wis.

Motor Boatmen's Charts and Log Sheets

Published by MoToR BoatinG
119 West 40th St., New York

Charts printed on heavy cardboard 8½" x 11" and punched to fit standard loose leaf folder.

Contain name and location of all principal ports and harbors, distances, compass courses and sailing directions. Invaluable for use on small boats and motor yachts. The set now includes the following charts:

Series A

No. 1—Western End of Long Island Sound.
No. 2—Eastern End of Long Island Sound.
No. 3—Block Island Sound.
No. 4—New York Harbor.
No. 5—Boston Harbor.
No. 6—Buzzards Bay.
No. 7—Block Island to Vineyard Sound, including Narragansett Bay.
No. 8—Delaware Bay.
No. 9—Chesapeake Bay, Part 1, Upper Part.
No. 10—Coast of Maine, Portland to Rockland.
No. 11—Hudson River, Kingston to Albany.
No. 12—Chesapeake Bay, Part II, Central Part.

Series B

No. 13—Lake Erie—Eastern Part.
No. 14—Lake Erie—Western Part.
No. 15—Hudson River, New York to Kingston.
No. 16—Lake Champlain.
No. 17—Erie Barge Canal.
No. 18—Massachusetts Coast.
No. 19—New England—Newburyport to Portland.
No. 20—Cape Cod Bay.
No. 21—Maine, Monhegan to Eastport.
No. 22—Chesapeake Bay, Part III, Lower Part.
No. 23—Biscayne Bay.
No. 24—St. Lawrence River and Thousand Islands.

MoToR BoatinG's New Charts—Series C

The third series of MoToR BoatinG's popular charts begins with No. 25, which covers the Delaware River from Trenton to Philadelphia. Others in this series which follow will complete the route to the sea via the Delaware River as well as cover many interesting stretches of cruising waters on the way south and along the coast. It is planned to issue these about as listed below:

No. 25 Nov., 1921..Delaware River, Trenton to Philadelphia.
No. 26 Dec., 1921..Delaware River, Philadelphia to Smyrna.
No. 27 Jan., 1922..New Jersey Coast, Cape May to Little Egg Inlet.
No. 28 Feb., 1922..New Jersey Coast, Little Egg to Barnegat Inlet.
No. 29—March, 1922.New Jersey Coast, Barnegat Inlet to Sandy Hook.
No. 30 April, 1922.Chesapeake Bay, Smith Point to Cape Charles.
No. 31 May, 1922..Potomac River to Lower Cedar Point.
No. 32 June, 1922..York and James Rivers.
No. 33 July, 1922..Delaware Coast, Cape Henlopen to Chincoteague Inlet.
No. 34 Aug., 1922..Virginia Coast, Chincoteague to Cape Charles.
No. 35 Sept., 1922..North Carolina Coast, Cape Henry to Beaufort.
No. 36 Oct., 1922..Carolina Coast, Beaufort to Charleston.

Log Book

MoToR BoatinG has also published a log sheet to fit the standard 8½" x 11" loose leaf folder. Each sheet contains spaces for such data as time of passing various aids to navigation, names of aids, magnetic and compass courses, distances, patent log readings, speed of boat, revolutions of motor, wind direction and force, condition of weather and sea, depths of water, fuel, time of high and low water, etc., etc.

Prices

Charts 25 cents each or $1.50 per set of 12, 36 Charts for $3.50 (Series C will be sent as published). Log Sheets $1.00 per set of 50 Sheets.

Loose Leaf Binders (canvas bound) to hold Charts and Log Sheets, $1.75.

36 Charts, 50 Log Sheets and Loose Leaf Binder to hold Charts and Log Sheets, $5.00.

MoToR BoatinG

119 West 40th Street, New York

Miss Mississippi, a Fast Little Hydroplane

(*Continued from page 28*)

pine and to be approximately 7 inches in width. To be fastened to beams and 7/16 by 1½-inch battens, suitably spaced. The battens and partner to be let into beams and screw fastened. All decking is to be of ¼-inch stock. Brass screw fasten into beams and copper clinch nail through the battens and finish with flush fastenings. Slightly round off the outside of the covering board and finish with a 1¼-inch half round mahogany, or oak moulding, all holes to be wood plugged.

Bulkhead: There is to be a water tight bulkhead of ⅜-inch ply wood on station No. 3. It is to be set in canvas and marine glue and screw fastened.

Cock-Pit: The cockpit is to have a ½-inch coaming forward, 7/16-inch on the sides, and ⅝-inch on the back, all of mahogany. It is to be screw fastened and wood plugged. There will be a partial bulkhead on stations ⅞ or ⅝-inch mahogany and to have a ⅜-inch by 1¼-inch cap flush screw fastened. The seat front is to be of ⅝-inch mahogany and the top of 9/16-inch pine. It is to have a pine support on each stringer as per plan. The flooring as indicated is to be of ⅝-inch pine screw fastened.

Painting and Finishing: The hull is to be thoroughly dressed and sanded and to have a coat of hot oil (2/3 boiled linseed oil and 1/3 turpentine mixed and applied boiling hot) up to the water line on the outside and to the chines on the inside. Fill all seams with a composition made from dry lead and Valspar mixed to a thick paste. When this is dry, sand and apply a coat of lead in oil thinned with turpentine to the proper consistency with a little light drier added. No oil to be used. Apply a heavy coat of the same paint on the inside up to the chine line. The sides, decking, coaming, bulkhead, etc., to be properly cleaned up, fill the mahogany with best filler and then apply three coats of Valspar. The sides of hull on the inside to have two coats of varnish if natural finish or two coats of the desired color if painted. Flooring, seat tops, etc., to have two coats of desired color of pure lead paint. Bottom is to have three coats of bronze bottom paint or three coats of plumbago if polish is desired. The latter is recommended. All coats of paint and varnish are to be properly applied and well sanded down between coats.

Fittings and Equipment: Steering gear is to consist of a special vertical type wheel to have a solid post with drum and special bracket to attach to the stringer. One special bow type rudder of manganese bronze fitted with a special tiller and stuffing box. Four special sheaves and ¼-inch bronze cable fitted with the necessary fairleads.

Strut to be of manganese bronze of a special type, fastening to the keel and transom and of the proper angle.

Stem is to have ½-inch half round brass stem band screw fastened.

Tank is to be a special type 12 by 13½ by 21-inches, made of 16 gauge galvanized steel. It is to have one splash plate and a 2-inch filler opening. It is to be installed in between stringers on a suitable backing. A ¼-inch opening is to be provided for the supply and a ⅛-inch opening on top for air pressure. A gravity tank may be installed on the after deck if desired and in which case any standard tank of good construction will be suitable.

Fitting will be, a special bow chock, one 8-inch cleat forward, one 7-inch cleat aft, one regulation bow flag socket, one 4-inch deck plate over the tank, one 5-inch cleat on each side if desired, and one metal shaft log type KS, Mechanical Devices Co. For those who so desire the architect is prepared to furnish the complete fittings to suit this design.

Motor Installation: The motor is to be a three cylinder 18-25 h.p. Pierce-Budd. It is to be properly aligned and fitted to a 1⅛-inch shaft, securely bolted to the foundation timbers. The water connections are to consist of a standard type scoop and screen fitted with a globe valve on the inside. It is to be connected to the motor with suitable rubber hose on both inlet and outlet lines. The rubber hose is to be secured with suitable clamps. The exhaust shall be carried through the regular manifold with an elbow and pipe to one side or above. Stacks may be used if desired. A copper tubing can also be extended through the stern of a suitable size as recommended by the manufacturer in which case a portion of the circulation water should be permitted to run through the pipe. All wiring is to be made with such wire as is recommended by the manufacturer and executed in a first class manner. The motor controls are to be carried to the bulkhead or the steerer as desired. The propeller shaft is to have a standard tapered end. The recommended propeller for this engine and boat is a 16 by 24-inch two bladed wheel.

Advertising Index will be found on page 134

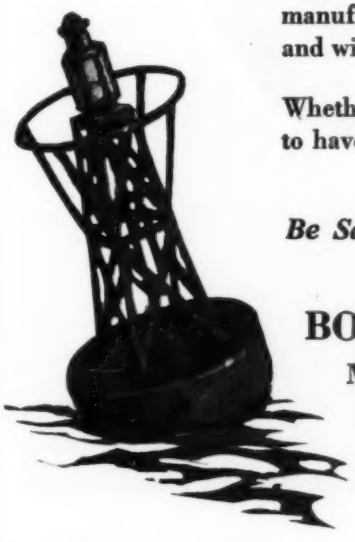
POWER—
Constant, Reliable, Economical

OLD boatmen, who have had years of experience with motor boats, will tell you that there's no ignition system quite so dependable and efficient as the Bosch High Tension Magneto.

Thousands of these veteran boatmen are today using Bosch Magnetos that have been in constant service for years, and have not failed once in all that time. Tens of thousands—younger in experience but ardent boatmen—are enthusiastic boosters for Bosch because of the wonderful service it has given them.

Manufacturers that have been making boats and supplying engines for years will tell you that sales are easier to make when Bosch Magneto Ignition is furnished. It helps to maintain the manufacturer's reputation, gives added prestige to his product, and wins the confidence of both the dealer and the buyer.

Whether you are making, using or buying motor boats, be sure to have them Bosch Equipt—Ignition, Starting, Lighting.



Correspondence Invited

Be Satisfied ***Specify Bosch***

AMERICAN
BOSCH MAGNETO CORPORATION

Main Office and Works: Springfield, Mass.

Branches: New York Detroit Chicago San Francisco

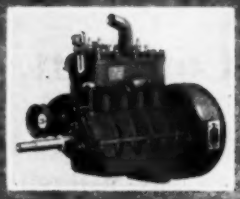
Over 500 Service Stations in 500 Centers

QUALITY SNAP RINGS

"Fast from Fast"

Easy to Install
Quick Seating
Long Lived
Accurate

LE ROI COMPANY



Le Roi Engines are *also* equipped with Quality Snap Rings

More Than a Million a Month

THE Perfect RING COMPANY

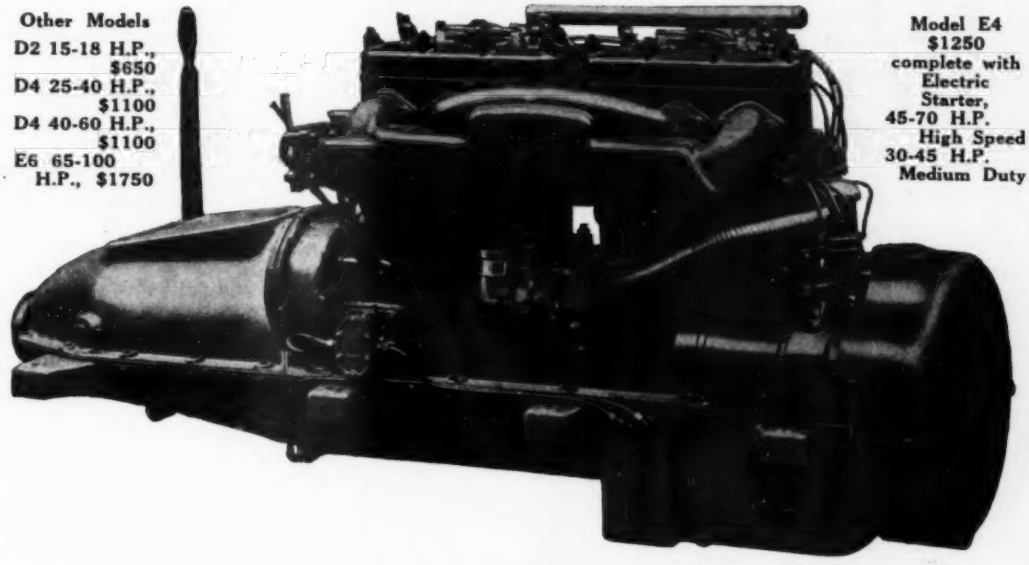
MUSKEGON, MICH.

Advertising Index will be found on page 134

Scripps

"The Motor that Crossed the Atlantic"

Other Models
D2 15-18 H.P., $650
D4 25-40 H.P., $1100
D4 40-60 H.P., $1100
E6 65-100 H.P., $1750



Model E4 $1250 complete with Electric Starter, 45-70 H.P. High Speed 30-45 H.P. Medium Duty

The Greatest Improvement in Motor Performance

The SCRIPPS four cylinder model has always been America's most popular engine among good marine motors—more are used than any other four cylinder rating above 25 H.P—in cruiser, runabout, commercial and auxiliary work.

In the new "E" series, a real fine motor has been made infinitely better.

Chief among the many engineering achievements is the new HOT SPOT MANIFOLD, an exclusive 1922 SCRIPPS feature. This absolutely conquers low test gasoline, providing perfect vaporization—equal distribution and perfect combustion. It means that every drop of fuel is worked to the maximum and made to deliver greater power than previously obtained from the same cylinder size, and also establishes a new record in economy. A fuel consumption on low grade gasoline of 6/10 pounds per horsepower hour is obtained.

It is a motor you will love to drive—it adds a new sense of enjoyment—loads of pep—responsive at all speeds—clean and quiet—no sign of vibration—and always the old dependability and endurance in which SCRIPPS has excelled for years.

Get acquainted with the entire line—two, four and six cylinder models, medium duty and high speed types, gasoline or kerosene—a motor for every purpose.

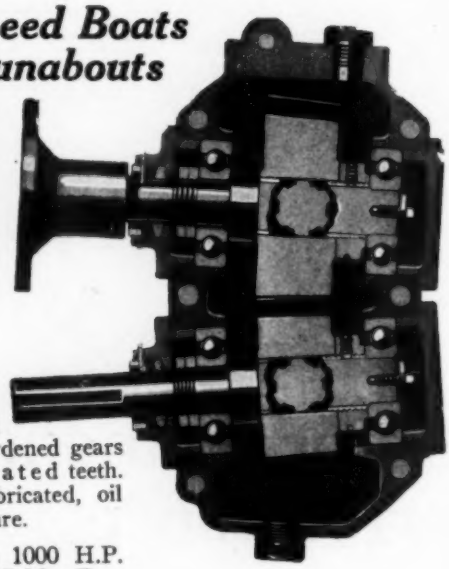
SCRIPPS MOTOR COMPANY

5819 Lincoln Avenue Detroit, Michigan

"Every Moving Part Enclosed"

CROSS GEAR BOXES

For Speed Boats and Runabouts

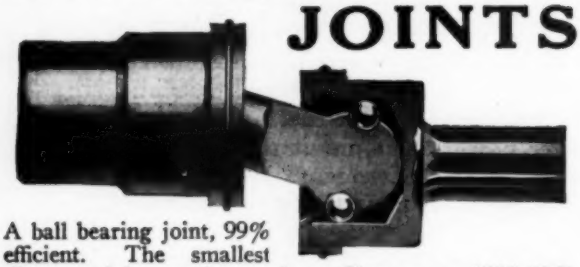


Properly designed and accurately made to transmit great power at high speed with maximum efficiency.

Ball bearings throughout. Splined shafts. Hardened gears with generated teeth. Properly lubricated, oil tight enclosure.

Sizes up to 1000 H.P. and 2000 R.P.M. Furnished for either angular or straight drive.

UNIVERSAL JOINTS



A ball bearing joint, 99% efficient. The smallest diameter joint on the market. Sizes up to 1000 H.P.

REVERSE GEARS

for all high speed, high power motors.

Let us help you on your installation and power transmission problems. Cross products are now used by some of the best builders. Write today.

Cross Gear & Engine Company

3255 Bellevue Avenue Detroit, Michigan

Questions and Answers on Lesson No. 2

(*Continued from page* 37)

29. Q: When a side light is visible on your port side and the upper white (range) light is to the right of the lower white light, what does it indicate and what is your action?
A: *Other boat has or will clear your course; hold your course and speed.*

30. Q: When a side light is visible on your port bow and the upper (range) white light is to the left of the lower white light, what does it indicate and what is your action?
A: *The other boat's course is approaching your course, danger of collision exists, your boat has right of way and should hold course and speed; other boat must keep clear.*

31. Q: When a side light is visible on your starboard bow and the upper (range) white light is to the left of the lower white light, what does it indicate and what is your action?
A: *Other boat has or will clear your course; hold your course and speed.*

32. Q: When both green and red lights are visible and the two white lights are becoming nearer and nearer vertical, what does it signify and what is your action?
A: *Other boat's course is approaching yours; danger of collision is becoming more acute; navigate with caution.*

33. Q: When both green and red lights are visible and the two white lights are separating more and more from the vertical, what does it signify and what is your action?
A: *Other boat's course is diverging from yours; danger of collision is becoming less acute.*

34. Q: What lights are carried by a row boat?
A: *A white light kept ready at hand to show when necessary.*

35. Q: Between what hours are lights carried?
A: *From sunset to sunrise.*

The following, whose papers were received during March, have passed:

LESSON No. 1

Willard H. Branch, Stanley Bell, J. H. Belt, Fred J. Klink, A. F. Keck, James E. Knox, Arthur E. Kumm, Charles Nagel, H. A. Renner, C. Custer Robinson, H. H. Slack, Meredeth Scott, Mrs. John J. Slater, A. Scholz, Geo. L. Sheppard, L. A. Sackett, N. F. Woodhull.

LESSON No. 2

Harold P. Cahill, Willard M. Foster, A. F. Keck, Arthur E. Kumm, H. H. Slack, A. Scholz, N. F. Woodhull, Roy E. Williams, August G. Weber.

LESSON No. 3

R. A. Crosthwaite, Harold P. Cahill, Willard M. Foster, Albert Gayer, Herbert Galloway, Arthur E. Kumm, Donald Spoor, August G. Weber.

LESSON No. 4

Charles A. Baker, R. A. Crosthwaite, Willard M. Foster, Herbert Galloway, Arthur E. Kumm, Mrs. C. H. Philpott, August G. Weber.

LESSON No. 5

William A. Butler, Milton C. Bergey, Willard M. Foster, Herbert Galloway, Frederick Lewis, Alexis M. Russell, W. A. Royce, Donald Spoor, Miss Sadie Steinmetz, C. W. Wilson.

LESSONS Nos. 6-7

H. C. Burr, Milton C. Bergey, Mrs. W. E. Clarke, Willard M. Foster, Herbert Galloway, Louis A. Kumm, Frank O'Beirne, W. A. Royce, H. P. Shay, Dorothy O. Smith, Barbara F. Smith, C. W. Wilson.

LESSON No. 8

Will B. Barnett, Milton C. Bergey, Mrs. W. E. Clarke, Willard M. Foster, Forrest D. Greene, Herbert Galloway, Lester L. Harrington, J. W. King, Arthur E. Kumm, Frank O'Beirne, F. Rudolph, W. A. Royce, H. P. Shay, Barbara F. Smith, Donald Spoor, W. Blood Smyth, H. H. Sellew, Geo. H. Thurston, C. W. Wilson.

LESSON No. 9

Will B. Barnett, L. F. Brower, E. C. Barnes, Milton C. Bergey, Forrest D. Greene, J. W. King, Louis A. Kumm, Arthur E. Kumm, Frank O'Beirne, Donald Spoor, W. Blood Smyth, H. H. Sellew, Stanley C. Wilcox, C. W. Wilson.

LESSON No. 10

Will B. Barnett, Seymour M. Bradley, W. S. Betts, W. C. Gustafson, Forrest D. Greene, Edwin Holliday, J. Edwin Jones, Louis A. Kumm, Arthur E. Kumm, Frank O'Beirne, J. K. Sexson, W. Blood Smyth, Stanley C. Wilcox, C. W. Wilson.

LESSON No. 11

John C. Brodhead, Henry Byers, Albert J. Fenton, W. J. Gorton, Lester L. Harrington, A. E. Jones, Edwin Holliday, Louis A. Kumm, Arthur E. Kumm, H. A. Nelson, Frank O'Beirne, J. K. Sexson, Walter Slocum, H. R. Stiles, W. Blood Smyth, Fred Scadden, L. E. Wilson, Stanley C. Wilcox, C. W. Wilson, M. A. Young.

(*Continued on page* 118)

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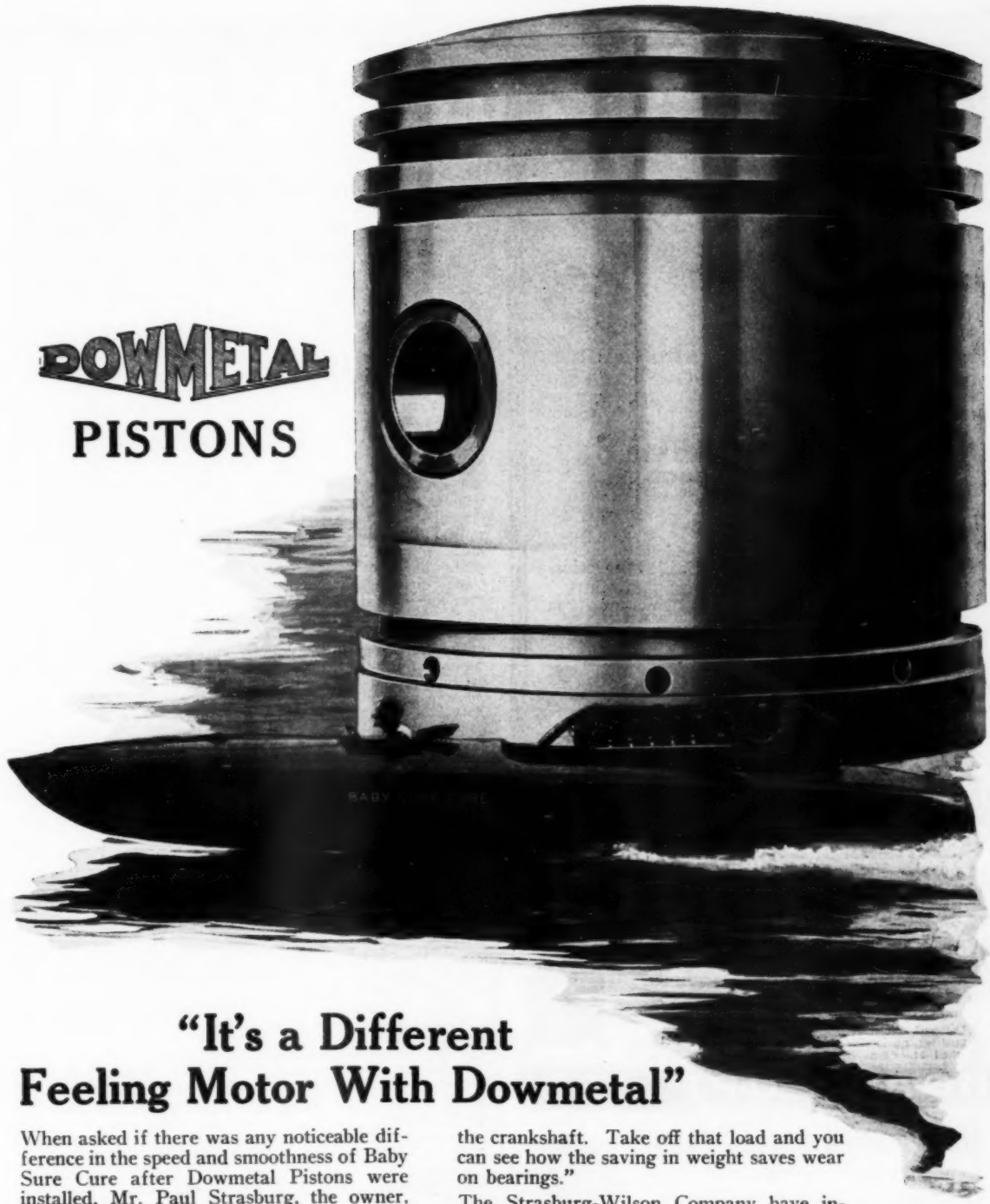


DOWMETAL

PISTONS

"It's a Different Feeling Motor With Dowmetal"

When asked if there was any noticeable difference in the speed and smoothness of Baby Sure Cure after Dowmetal Pistons were installed, Mr. Paul Strasburg, the owner, exclaimed,—"I should say there was—it's a different feeling motor—a sweeter sounding, sweeter running motor in every way.

"First of all, Dowmetal reduced engine vibration, increased our R. P. M.'s by 100 and took the overload off the crankshaft and bearings. Why, Man!" exclaimed Strasburg, "think what it means at 2000 R.P.M. to take a half pound off every piston—that's a load of 18 tons per minute removed from the crankshaft. Take off that load and you can see how the saving in weight saves wear on bearings."

The Strasburg-Wilson Company have installed 2 sets of Dowmetal Pistons in Mr. Edsel Ford's cruiser Greyhound after exhaustive tests that were in every way satisfactory.

The strength and lightness of Dowmetal with the sturdiness and soundness of design make this the appropriate piston for all motor boat engines where speed and long wear are desirable. For particulars address, Dowmetal Division,

THE DOW CHEMICAL COMPANY TRADE DOW MARK Midland

CAILLE DETROIT

Weeds Can't Stop This Motor

Goes through weeds like an eel. Shallows, too, can't stop it. Will drive boat anywhere it will float. Nor can stones or sunken logs put it out of commission. The propeller automatically rises over them. For the Caille

Liberty Drive
ROWBOAT MOTOR

pivots on the stern of the boat vertically and horizontally. Enables you to beach boat anywhere. Develops 2 H. P. and drives boat 7 to 10 miles an hour or at trolling speed. Price $75.00. Send for details. Dealers wanted.

Battery Type Liberty Drive Motor. Also furnished with Magneto.

The Caille Perfection Motor Company
45 Caille Bldg., Detroit, Mich.

$75.00 with Battery Ignition

R. W. ZUNDEL CO. INC.

ZUNDEL

Everything for the Motor Boat. Complete stocks of the best and most popular Marine Paints, Hardware and Supplies. Radio telephone sets and radio supplies.

Universal Joints

Flange Couplings

6-volt Marine Horn, 9 in high, 4 in. wide at base, weighs 2¾ lbs. Price $7.50

R. W. ZUNDEL COMPANY, INC. 1 BLOCK FROM SO. FERRY
47 Whitehall St.—Phone Bowling Green 9157—New York, N. Y.

BOAT SUPPLIES

This Summer's Racing Program a Busy One

(*Continued from page* 40)

inches, and less. The requirements as to length and piston displacement of this class are the same as in the Gold Cup race except that for the Interstate Championship Trophy the boats must be powered with marine motors. The 1922 race for this trophy will be held by the Interlake Yachting Association at their annual regatta at Put-in-Bay, July 19, 20 and 21. The Interstate Championship Trophy was won in 1905 by Durno, in 1906 and 1907 by Sparrow, in 1908 by Vim, in 1909 by Den, in 1910 by Edith II, in 1911 by Hazel, in 1912 by Vita, in 1913 by Red Devil and in 1914 by Muirmaid.

The Motor Yacht Championship Trophy will be held by the Detroit Yacht Club at their regatta, August 26th to September 5th. This race will be open to express and speed cruisers of over 45 feet water line length, powered with marine motors. It will be a free-for-all race without handicap and may consist of one heat of at least ninety miles in length, or the distance may be equally divided into three separate heats. Winners of the Motor Yacht Championship Trophy in the past include such boats as Alabama, Avis, Wanderlust, and Flora Del Mar.

The trophy which was formerly known as the Cabin Launch Championship Trophy, will be renamed the Handicap Express Cruiser Trophy and will be competed for on Long Island Sound in connection with the race conducted by the New York Athletic Club on August 5th at the same time that the Handicap Cruiser Championship race is held. This race will be open to express cruisers of between 30 feet and 60 feet water line length, powered with marine motors. The course for 1922 will be approximately fifty nautical miles in length.

In addition to the above trophies which were presented to the American Power Boat Association by the National Association of Engine and Boat Manufacturers, James Craig turned over to the American Power Boat Association also a very valuable trophy which was won by him with his boat, Ailsa Craig, in the race to Bermuda in 1907. This trophy was formerly presented by James Gordon Bennett and has been held by Mr. Craig ever since he won it fifteen years ago. It is now offered in an effort to stimulate and rejuvenate off-shore racing among small craft.

For the 1922 race for the James Craig Trophy, it is planned to hold a race under the auspices of the Columbia Yacht Club of New York City and the Atlantic City Yacht Club, from New York to Atlantic City and from Atlantic City to New York. The two races will be held simultaneously, the boats starting at each end early in the morning and laying up overnight at the half way mark. This will make two daylight runs of somewhat over 100 miles in length.

The Gold Cup races for 1922, as has already been announced, will be held at Detroit, Michigan, August 26th to September 5th. The requirements for the Gold Cup race this year have been radically changed and for this year's event, only displacement boats of 25 feet in length, or over will be permitted to compete. The boats will be limited in power to 625 cubic inches piston displacement. The water line beam must not be less than five feet at the widest section and the boats must exhaust at the stern or under water when under way. The competing boats must be fitted with at least two transverse bulkheads, have the motor compartment entirely enclosed and have seating accommodations for at least four persons. The propeller must be driven direct from the engine and no gear boxes of any description are permitted.

This summer's race for the Fisher-Allison Trophy will be held at Hamilton, Ontario, August 17, 18, 19. This is a race for displacement runaboats of at least 32 feet in length, powered with marine motors of not over 3000 cubic inches, piston displacement. The race consists of three fifty-mile heats on consecutive days with no repairs to power plant or hull between heats.

The race for the Wood-Fisher Trophy will be held at Detroit, August 26th to September 5th. The requirements for this race are similar to the Fisher-Allison Trophy race with the exception that the power plants are not limited to marine motors and the piston displacement must not exceed 2,250 cubic inches.

One of the most important races of the year will be those in connection with the Pageant of Progress at Chicago, to be held August 3 to 6. The Pageant of Progress races will have events for all hydroplane classes. The Interlake Yachting Association Regatta for all classes will be held at Put-in-Bay, July 19 to 21, and the annual regatta of the Toronto Motor Boat Club will be held at Toronto, September 3 to 7.

Complete summaries and schedules of the important regattas will be found on pages 40 and 44.

The Mississippi Valley Power Boat Association and the American Power Boat Association Decide on a System for Uniform Numbers on Racing Boats

FOR the past several years, some confusion has resulted due to the fact that racing craft have been obliged to carry a different racing number in the various events in which they competed. For example, Nick Nack, was assigned No. 2 last year in the Buffalo races, No. 6 in the Detroit races, and No. 25 in the Toronto races. Aside from the confusion which was caused, the owners strenuously objected to the constant painting of different numbers on the sides of their boats which, besides the trouble it entailed, tended to disfigure their boats, so they claimed.

At the last Annual Meeting of the American Power Boat Association, it was suggested that an effort be made to bring the various Associations together and see whether an arrangement could not be worked out so that a boat would carry the same racing number throughout the season, irrespective of the particular races in which she competed.

The Mississippi Valley Power Boat Association and the American Power Boat Association have agreed on a system of numbering from now on which, it is hoped, will eliminate the changing of numbers. It did not seem feasible to number the boats continuously from 1 upward, but it has been decided to prefix a letter with the number to designate the boat's class. Different classes will use different numbers. For example: boats competing in

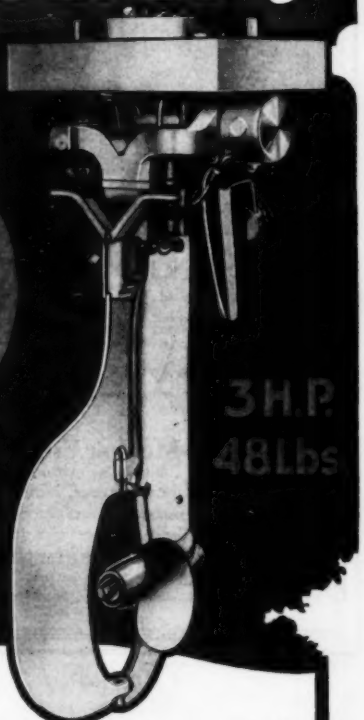
(*Continued on page* 118)

Advertising Index will be found on page 134

Have You Seen It?

Ole Evinrude's Latest Motor

19 Big. New Features



THE Elto has not yet seen its second summer. Yet today, Elto owners are in all parts of America and in a great many foreign countries. Interest in Ole Evinrude's latest motor is world-wide and growing in intensity daily.

The Elto is the original Light Twin. Rugged, long-wearing; the most powerful light-weight motor. Full 3 H. P.—48 lbs.

The Elto always starts easily. No spinning of fly-wheel is ever necessary. The twin cylinders fire at the same instant. This, with precisely fitted parts and careful balancing, results in exceptionally smooth, quiet running. The motor tilts automatically. Steers from any part of the boat. Slows down to perfect trolling speed. Has folding rudder; under-water exhaust; 19 big new features. Ask your dealer. Write to Ole Evinrude's new organization for descriptive literature.

Elto Carrying Case

Dealers: Write for attractive proposition.

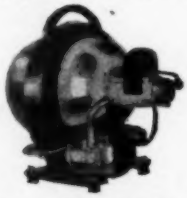
Elto Outboard Motor Co.
OLE EVINRUDE, Pres.
Dept. F Mfrs. Home Bldg. Milwaukee, Wis.

Elto

Light Twin Outboard Motor

HOMELITE

The PORTABLE Electric Light and Power Plant
Not the lowest price but the cheapest and best



Something new for your boat in a dependable electric light and power plant

COMPACT—
HEIGHT but 18½ in.
LENGTH 20 in.
WIDTH 13 in.
Easy to stow away yet always ready for instant service.
WEIGHT but 100 lbs.—
PORTABLE—you can take it ashore if you wish.

Has a Simms high tension magneto—can be started by hand if you happen to have let your batteries run low. It's air cooled.

Lights boat, charges batteries, runs bilge or fire pump.

ECONOMICAL—a gallon of fuel furnishes 2,000 watt hrs. 12 or 32 volt.

Smith-Meeker Engineering Co.
Eastern Marine Distributors
123 Liberty Street, New York, N.Y.
WRITE FOR BOOKLET AND PRICES

The Simms Magneto Company
Manufacturers
East Orange, New Jersey

Yard and Shop

(*Continued from page* 42)

the claim of the defendant, that the said commissioners had no power or authority to charge any license, fee, or tax for anchoring boats in such inner and outer harbors, on the ground that the law prohibited the levying of any taxes in excess of an amount stipulated by law, was upheld. As it was now shown that the South Park Commissioners owned the water or had placed obstructions therein with the consent of the War Department; or that they had levied the special anchorage tax under powers granted them by law, the Court directed the jury to find for the defendant. Until two years ago, anchorage for pleasure boats was free; now a fee ranging from $7.50 to $40.00 is exacted depending on the size of the boat.

Hall-Scott Distributors for Chicago

The Kargard Boat & Engine Co. have opened a new sales room and shop at 3242 N. California Avenue, Chicago. This company is headed by Peter Kargard, who has designed and built boats for a long time and who bears an excellent reputation among the yachtsmen of the Middle West. Associated with Mr. Kargard is Mr. Jos. G. Grogan, who will look after the sales covering the products they handle. The Hall-Scott Motor Car Co. of Buffalo announce that they have given the distribution of their marine engines in that locality to this company and a six-cylinder, 200-h.p. motor has been purchased and placed on their sales room floor to show people interested in this wonderful product. The Kargard Company is building a fast twenty-eight-foot runabout to be powered with a 200-h.p. Hall-Scott six, for Anton Cermak of Chicago for use on Lake Catherine. This craft will be launched in May and is expected to clip off better than 40 m.p.h., making it one of the fastest runabouts in that locality.

Hall-Scott marine engines have been made popular in Chicago by Webb Jay, inventor and sportsman of that city. Mr. Jay has purchased and has owned five Hall-Scott marine engines. At the present time he is using a six-cylinder, 200-h.p. Hall-Scott motor in his 45-foot heavy cruiser Vacuum II; also a six-cylinder, 200-h.p. Hall-Scott in his runabout Adieu, with which he has twice won the $500.00 Gold Fisher-Allison Trophy for the Champion runabout of America powered with marine engines. Wm. R. Johnston of Chicago is replacing the eight-cylinder engine in Humdinger with a 200-h.p. Hall-Scott six. This boat is a forty-foot cruiser, formerly Sarah Jane, owned by Jos. M. Rowland of Philadelphia, and designed by Geo. F. Crouch.

This Summer's Racing Program a Busy One

(*Continued from page* 116)

the Mississippi Valley's 151 cubic inch class, will be numbered A-1, A-2, A-3, etc. Gold cup boats will be numbered G-1, G-2, G-3, etc.

The Mississippi Valley Association, at a recent meeting, passed the following resolution:

"Letters designating class, in addition to numbers assigned, assigned by Chairman of Race Committee, shall be painted conspicuously on every boat contending in any regatta under Association auspices in hydroplane classes."

The letters so far assigned to the various classes are as follows:

A	104 cubic inch;	hydroplanes
B	215 cubic inch;	hydroplanes
C	320 cubic inch;	hydroplanes
D	510 cubic inch;	hydroplanes
E	705 cubic inch;	hydroplanes
F	3000 cubic inch;	displacement boats (Fisher Trophy)
G	625 cubic inch;	displacement boats (Gold Cup)
H	940 cubic inch;	hydroplanes
I	1300 cubic inch;	hydroplanes
J	Webb Trophy	
L	1100 cubic inch;	hydroplanes
N	2250 cubic inch;	hydroplanes
R	1100 cubic inch;	displacement boats
U	unlimited Piston	Displacement hydroplanes
W	2250 cubic inch;	displacement boats (Wood-Fisher)

Of course if a boat in the 151-inch class numbered A-3, for example, competes in the next higher class at Peoria, she will still retain the number A-3. If she competes in the Chicago races, she will carry the same number. If she is entered in the Gold Cup race, at Detroit, she will still be numbered A-3.

If an unlimited single engine hydroplane class is held at Detroit, it is quite probable that entries will be received which have raced in the classes lettered "I," "J," "L," and "N" elsewhere. These boats will retain the same numbers at Detroit although entries which have not raced before will be given designations "U-1," "U-2," "U-3," etc., by the local committee at Detroit. It is hoped that it will be possible to retain the same numbers from year to year.

Removing Crankcase Oil

(*Continued from page* 35)

Chemical filter paper can also be used, but is not necessary. When a quantity of residue collects in the bottom of the filter paper, the cone is thrown out and a clean one substituted, while a felt filter can be washed. The filtered oil should be clear when held to the light, though it will probably be darker in color than the new oil; if black, the filtering material is not right and another must be tried. The filtering process will be very slow, but in time a considerable quantity of filtered oil can be obtained.

H. H. P., Oakland, Calif.

Successful March Students

(*Continued from page* 114)

LESSON No. 12

Charles E. Burch, Henry Byers, Michael Cibener, Albert J. Fenton, Vincent Francis, W. J. Gorton, H. Greinert, Kenneth Gess, J. A. Hain, Lester L. Harrington, Edwin Holliday, J. Edwin Jones, A. E. Jones, Mrs. E. G. Kaiser, Louis A. Kumm, Arthur E. Kumm, W. B. Landreth, H. A. Morton, H. A. Nelson, Edward J. O'Beirne, Frank O'Beirne, W. Blood Smyth, Fred Scadden, L. E. Wilson, Stanley C. Wilcox, C. W. Wilson.

LESSON No. 13

R. Andren, Percy Benedict, Dr. A. B. Bennett, Joseph Bister, W. G. Boyden, Henrick Bouche, John C. Brodhead, Charles E. Burch, Henry Byers, J. Calvert, L. L. Crosthwaite, Clarence Culver, Leslie H. Chapman, Arthur Ek, I. S. Ellsworth, Albert J. Fenton, Vincent Francis, Charles E. Grush, W. C. Gustafson, J. A. Hain, George Hansen, H. J. Hodgdon, H. A. Nelson, Edward J. O'Beirne, Frank O'Beirne, G. A. Patrie, Louis Preiss, Wm. Harry Palmer, Dr. J. F. Schefcik, J. K. Sexson, F. B. Smith, Morton B. Stelle, W. Blood Smyth, Otto A. Thomas, Dr. H. E. Watkins, Stanley C. Wilcox, C. W. Wilson,, L. E. Wilson, William O. Yates, C. S. Young.

The names below were not received in time to be included in the regular order above:
Walter W. Monroe, Lessons 6, 7, 8; F. G. Moe, Lessons 9, 10, 11; Chauncey L. Mitchell, Lessons 6, 7; W. W. Dickson, Lessons 12, 13; Frank E. Mitchell, Lesson 12; Dr. P. D. McSween, Lessons 11, 12, 13; Edward F. Mathers, Lesson 13; Dr. Henry H. Morton, Lesson 13; Ivan L. McKenzie, Lesson 13; P. F. McMahon, Lesson 13; W. B. Moores, Lesson 13; W. J. Mozart, Lesson 13; Kaspar I. Murphy, Lesson 13; Frederick Rudoulph, Lessons 9, 10; W. A. Royce, Lessons 9, 10, 11; Merle B. Ross, Lesson 13; Edmund Roxby, Lesson 13; John Reicherter, Lesson 13.

Advertising Index will be found on page 134

RAIN, SPRAY, SOLID WATER
Cannot harm this

waterproof type

RAJAH SPARK PLUG

HERE is a spark plug that is utterly unaffected by rain, spray or exposure. If you have an open boat or an outboard motor you'll appreciate what this means.

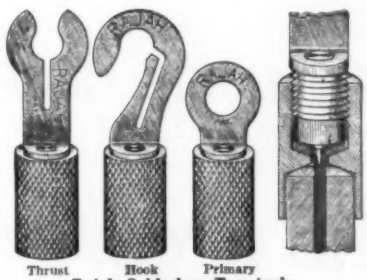
The porcelain is protected by a molded Condensite cap. Over this is a flexible rubber nipple that extends well over the insulation on the cable. This makes it absolutely Waterproof, Shockproof and Breakproof.

And under all this protection is the famous Rajah Spark plug, one of the oldest and best plugs on the market. A favorite with boatmen for 20 years.

$1.25. All Threads

How many times have you been stalled by a drenched spark plug? This can never happen with the Waterproof Rajah Plug. Put a set in your motor *now*.

If your dealer doesn't sell the Waterproof Rajah Spark Plug, order direct from us stating thread wanted

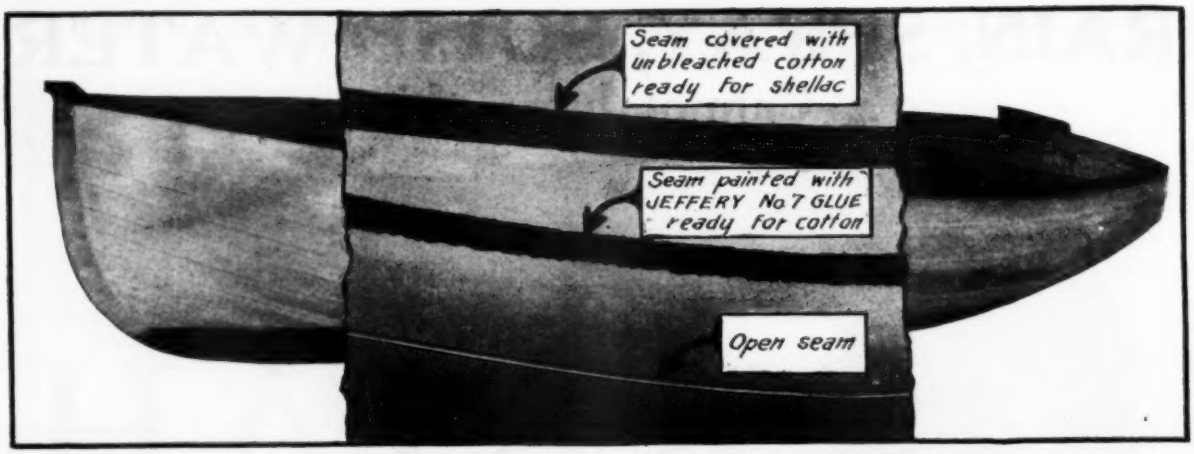


Rajah Solderless Terminals
(Actual size)

While you are fitting out, equip your spark plug wires with Rajah Solderless Terminals. Attached in a jiffy without solder or tools. 15c each, for any size cable.

Manufactured by

RAJAH AUTO SUPPLY CO., Bloomfield, N. J., U



DOES YOUR BOAT LEAK?

LET US TELL YOU ABOUT

JEFFERY'S
WATERPROOF
MARINE GLUE

The enlarged section of the above illustration shows how the hull seams of a boat can be treated when the owner does not care to go to the expense of covering the entire hull with cotton or canvas as recommended in our booklet entitled, "How to make your boat leakproof."

The lower seam is shown open, as usually is the case when a boat is laid up during the winter, the middle seam is shown painted with a coat of our Jeffery's No. 7 Marine Glue ready for the cotton fabric which is laid on the glue and ironed into it with a warm flat iron as shown on the top seam. The cotton is then given a coat of shellac and painted. When the job is completed according to these directions the patching strips can scarcely be detected.

We however believe and earnestly recommend that if a more permanent result is desired, the entire surface be covered with fabric, laid in our Jeffery's No. 7 Black soft quality Marine Glue. This treatment will insure a boat with a coat of paint once a year being absolutely watertight indefinitely.

Send for our booklets, "How to Make Your Boat Leakproof"
and "Marine Glue—what to Use and How to Use it"

JEFFERY'S WATERPROOF MARINE GLUE
In all the various grades

For sale by all Yacht, Boat and Canoe Supply Houses, Hardware, Paint and Oil and Sporting Goods Dealers.

L. W. FERDINAND & CO.

152 Kneeland Street **Boston, 11, Mass.**

Advertising Index will be found on page 134

Sabalo—An Ocean Going Yacht

"Sabalo," one of the finest examples of Off Shore Cruisers, is now equipt with a pair of Winton Diesel Oil Engines developing 300 H.P. a piece. She is 140′ x 19′ 6″ x 7′ and was built by Geo. Lawley & Son Corp. from designs by Tams & King, and is owned by Mr. Van Lear Black.

Her new power plant gives "Sabalo" a greatly increased cruising radius, marked economy in fuel cost and a dependable power unit which quietly, without vibration, drives this ship at an even cruising speed of 12 knots per hour.

"Sabalo" is but another example of the trend towards Winton Diesel Drive, either direct or electric, for the finer type of Off Shore Cruiser. Practically every new large yacht now under construction is to be Winton equipt.

Winton Engine Works Cleveland, Ohio, U.S.A.

New York:—A. G. Griese, Inc., 30 Church St. New Orleans, La.:—A. Baldwin Company. San Francisco:—F. G. Bryant, 593 Market St. Washington:—R. L. Fryer, 817 Albee Bldg. Seattle:—H. W. Starrett, Sunset Engine Company.

Winton

Just Published—The Greatest Motor Boating Book Ever Printed

Piloting, Seamanship and Small Boat Handling

By Charles F. Chapman

This book has been published in response to repeated requests for us to bring out *in complete book form*

MoToR BoatinG's Correspondence Course

the wonderful illustrated course in Piloting, Seamanship, and Small Boat Handling which has been appearing regularly in the issues of MoToR BoatinG since February, 1921.

Profusely Illustrated with Nearly 300 Cuts and Diagrams

MoToR BoatinG's Correspondence Course proved to be the most successful and most popular feature ever undertaken by a boating magazine. Thousands of readers became better boatmen by studying this course. Now you will want it in permanent book form to keep aboard your boat for reference and guidance.

This course was prepared with an entirely new idea in text book or correspondence instruction. Instead of page after page of dry text matter with only occasional illustrations, it is composed mainly of pictures, drawings, photographs, charts and diagrams covering every situation and every point, with the purpose of each picture clearly explained by a concise and simple title.

You will find this book more enjoyable and easier to understand than any text book you ever read. You will find it correct and authoritative because it has been prepared by experts with years of boating experience and every necessary reference at hand.

You will find it easy to read and easy to remember because each chapter is reviewed by pertinent questions which reveal your understanding of the lessons.

The preparation of this Course has cost thousands of dollars. These books would easily cost $10.00 each if the work was undertaken for book purposes alone. And now you can have this entire Course in permanent form for only $2.00.

Price $2.00 ***Send your order today.***

MoToR BoatinG, 119 W. 40th St., New York, N.Y.

Advertising Index will be found on page 134

Hydroplane, Runabout and Cruiser Races

1922 **CHICAGO'S** 1922

Second Annual

Pageant of Progress

and TRADE EXPOSITION

July 29th to August 14th, inclusive

HYDROPLANE RACES
August 3, 4, 5 and 6.

RUNABOUT, CRUISER AND OTHER WATER EVENTS
(Dates to be announced later)

Races will be held in the North Harbor off the new magnificent Municipal Pier (the world's finest grandstand), where thousands of spectators can view the **ENTIRE COURSE.**

The largest number of

CASH PRIZES AND TROPHIES

ever put up for motor boats will be awarded.

Housing accommodations and facilities unsurpassed for the proper handling and care of the racing boats will be provided and at **NO COST** to contestants.

It will unquestionably be the motor boat event of the year. Plan to be with us **NOW.** Remember the dates.

For further information address Commodore Sheldon Clark, Chairman Pageant Race Committee, 111 W. Washington St., Chicago, Ill.

CHICAGO'S

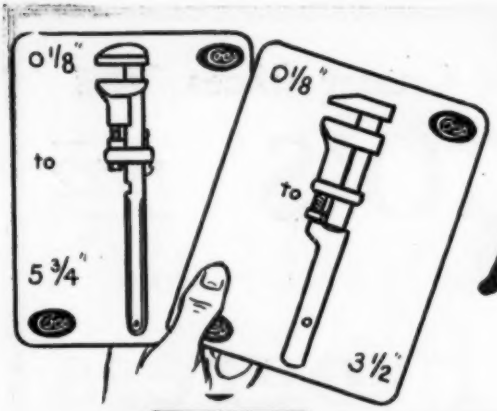
Second Annual

Pageant of Progress

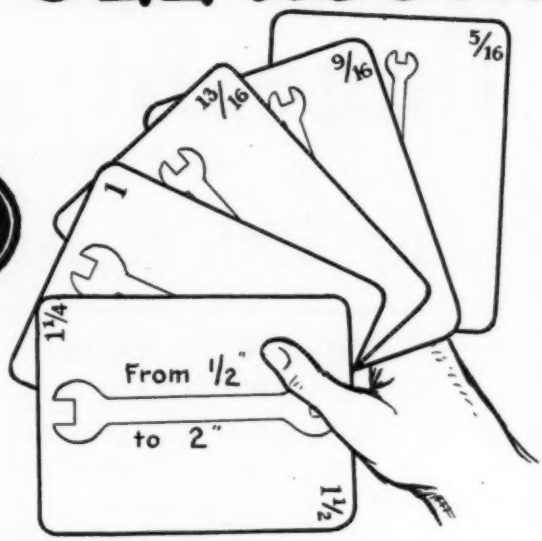
and TRADE EXPOSITION

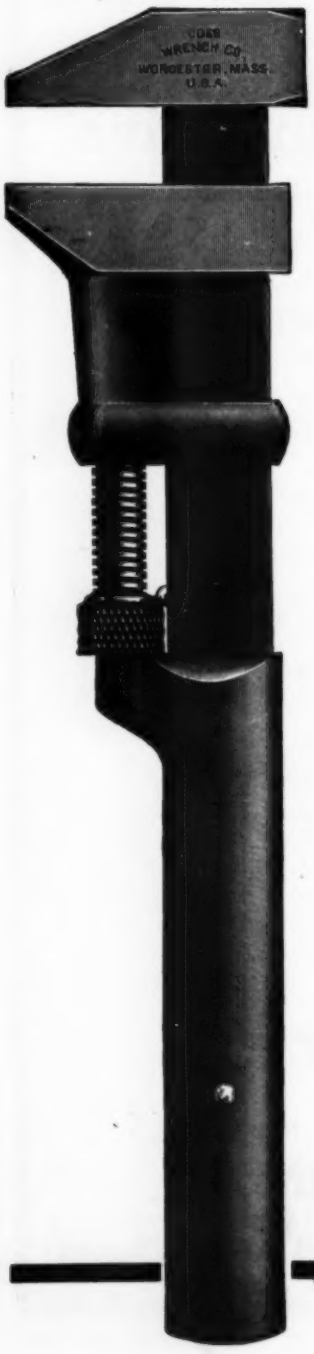
July 29th to August 14th

Hydroplane, Runabout and Cruiser Races All Sizes All Classes



THIS PAIR *BEATS* A FULL HOUSE





TRADE MARK
REG. U.S. PAT. OFF.
No. 64356
Coes

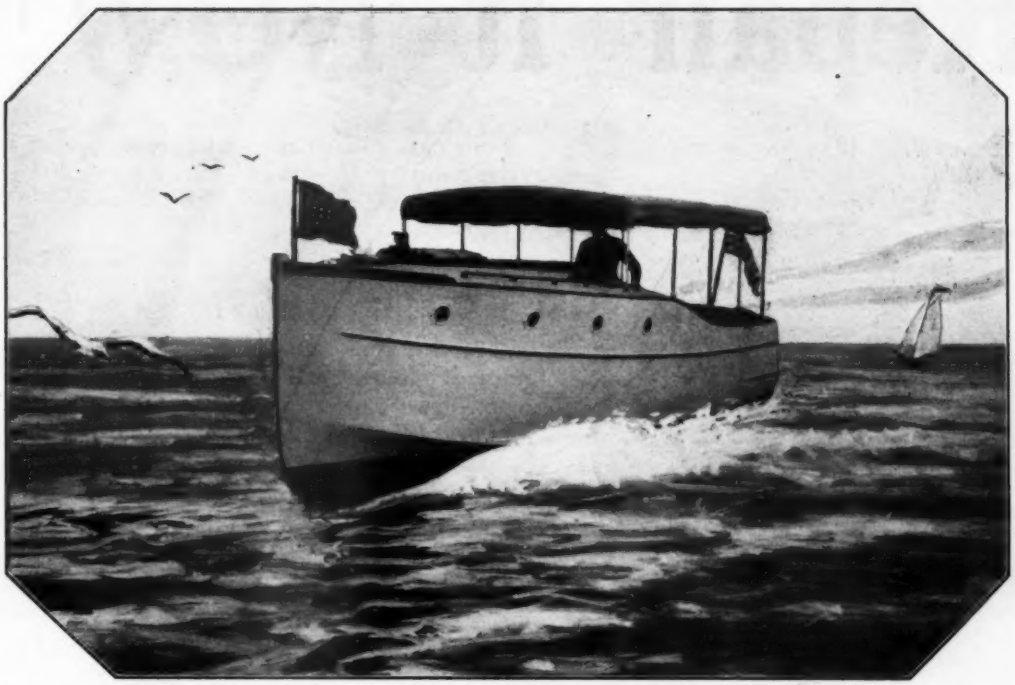
COES WRENCHES

Next time you have to crawl out from under and get one more open-ender, remember this, A COES Wrench always fits, it always holds, and one of them will fit more assorted nuts than a double-handful of open-enders.

Ask Your Dealer

COES WRENCH COMPANY
WORCESTER, MASS.

Advertising Index will be found on page 134



The "Liggett 28"

LIGGETT

FROM the design of "HAND," the shops of LIGGETT, and KERMATH powered, comes a small ship worthy of its creators.

In the Liggett Shops you will find men with years of training in the building of fine boats; you will find cabinet makers who understand only the finest class of finishing.

Under the direction of a master builder these men are producing the "LIGGETT 28" for the lover of good boats and for the man who wants only the best.

Finer finish, equipment or appointments cannot be found in the finest yachts, and the builder's desire to surpass everything in the small boat line has been fully realized.

The "LIGGETT 28" is a small ship ready to step aboard, and you have the waterways at your command with a staunch, wonderful, seaworthy craft of which you will be mighty proud.

These fine boats are on a production basis to be made in one type in a quantity sufficient to make the price noted a real possibility.

Length—28 feet (copper fastened).
(Accommodations equal to any 32 footer)

Beam—8½ feet.

Power—Kermath Vanadium 20.

Bosch Electric Starting, Lighting and Ignition.

Price, $3,100, including tax. White and Mahogany Finish.

Price, $3,500, including tax—for same boat with natural finish, mahogany planking.

Further Details and Specifications on Request.

A. G. LIGGETT & SON

WYANDOTTE (10 Miles from Detroit) MICHIGAN

"Repair It NOW!"

Your car, your truck, your tractor, your motorcycle, your motor boat,—every piece of internal combustion apparatus you have,—REPAIR IT NOW!

Repair parts are easy to get NOW. Repairmen have the time to give you thorough service NOW. In a couple of months **everyone** will wake up to the fact that repairs are needed. The shops will be jammed. Work will be rushed through. Repair parts will be harder to get.

There will be more repairs to make if your work is postponed for two months, for motors don't adjust or repair themselves,—they get worse the longer you neglect them.

Work that is hurriedly done cannot be as satisfactory as thorough work and costs more eventually.

Avoid the risk of delays, rush work and unsatisfactory repairs. REPAIR IT NOW!

And while you are getting your repair work done, have DELUXE light weight cast iron pistons installed in your motor. Piston replacement should be carefully done and NOW is the time to get real service.

All pistons should be replaced with DELUXE pistons. In fact, DELUXE pistons make overhauling worth while. The extra power, speed and flexibility they give a motor; the savings in gas and oil; the freedom from vibration will make you a DELUXE enthusiast.

Your dealer or repairman can get DELUXE pistons for you in any size or oversize for 1400 different types of motors on 24 hours' notice or less. He can handle any job you bring him NOW!

Be sure the pistons you have installed are DELUXE. **All good things are imitated, but look inside for the name "DELUXE". It is therefor your protection.** Look for the reinforcing ribs that extend, from a reinforcing ring, across the head and along the sides.

DELUXE pistons and coreboxes for making the same are thoroughly protected by U. S and foreign patents. We intend to vigorously defend our rights and prosecute all infringers.

You will find your dealer or repairman in hearty co-operation with the national **"Repair it now"** campaign that we are carrying on. For not only do **you** benefit, but so does everyone in every phase of the industry.

Take advantage of this opportunity to get your repair work done promptly, properly and reasonably. Write us for full information about DELUXE pistons for your car or other motor. Give name and model and above all REPAIR IT NOW.

DELUXE
LIGHT WEIGHT CAST IRON PISTON
"The Successful Light Weight Piston" ©

Clark-Turner Piston Company

INCORPORATED

Los Angeles, California

Advertising Index will be found on page 134

"That's some engine for trolling"

Any time you want to get a line on the Universal engine for dependability, just ask the fellow who uses it for trolling.

He will tell you that she pushes a boat through the water, so quiet and steady and sure, at two miles an hour, that you never have to think about it when you are fishing.

He will also tell you that you can step on the gas and get to and from your fishing grounds in mighty fast time, if you want to.

Remember, there is just one quality and one size of Universal engine, and it is a darn good one. 22 years of engine building experience has gone into it. A world wide reputation is back of it. The Universal name is on it.

It doesn't matter what kind of a boat you want to use a Universal engine for, she will do the work—for auto boats, launches, fishing boats and work boats anywhere from 14 to 30 feet in length. You can get the Universal with electric self-starter and reverse gear, if you want.

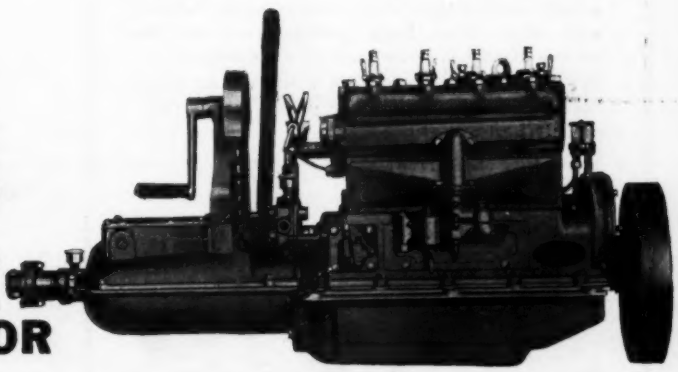
Get our catalogue now, and study up on what the ownership of a Universal means to you. The prices have been revised downward this year.

Universal Motor Co., Oshkosh, Wis.

Not connected with any other firm using the name "Universal"

Universal

4 Cylinder
9-12 H. P.
MARINE MOTOR



Note the simplicity of the L-A Rowboat Motor —note its sturdiness. Here is a man's motor —heavy enough to be strong and durable, light enough to be easily transported.

It starts every time!

You'll find that the Lockwood-Ash Rowboat Motor always starts—under any conditions. And reliability in starting is the real test of any rowboat motor.

Besides this, the L-A is speedy and thoroughly reliable—low in first cost and economical to use — and easy to operate.

Write for full particulars.

Lockwood - Ash Motor Co.
2207 Jackson St., Jackson, Mich.

LOCKWOOD-ASH
MARINE ENGINES
(92)

GENUINE
HARTHAN
TRUE SCREW
PROPELLERS

The principle of a True Screw is strictly followed out in the patterns from which all genuine Harthan Propellers are made. This type is known to be the most efficient.

Harthan wheels are made of a special bronze composition, very tough and strong. This allows a very thin blade, the edges of which are brought down very sharp, which, with the extra high polish, reduces the power-absorbing element to a minimum.

We can supply propellers with two or three blades, in practically any pitch, either right or left hand.

Look for the Trade-Mark on Each Blade
McFARLAND FOUNDRY & MACHINE COMPANY
1100 Willow St.,
TRENTON NEW JERSEY

Representatives
NEW YORK: Topping Bros., 122 Chambers Street.
PHILADELPHIA: F. Vandercherchen's Sons, 7 N. Water Street.

Short Cuts in Figuring

(*Continued from page* 98)

Find the antilog of 3.90345.
p. 767 next lower mantissa is 90342 = antilog 8006
our mantissa is 3 greater
tab. diff. is 5
the 5th figure = 3/5, or, decimal = .6

making complete antilog 8006.6

Find the antilog of 4.45550
p. 759 next lower mantissa is .45545 = antilog 2854
our mantissa is 5 greater
tab. diff. is 16
5th figure = 5/16, = .3

complete antilog = 2854.3.

Interpolation in Table 44. Table 44 gives directly the log. functions of all angles to degrees and minutes of arc. But if seconds of arc are desired, interpolation is necessary. In fact, dead reckoning problems are never figured to seconds of arc, but to minutes only. Still, it is well to understand the method of taking out the functions to seconds.

Find the log. sin of 35° 50′ 15″. At p. 807 we have:

log. sin 35° 50′ = 9.76747
log. sin 35° 51′ = 9.76765
diff. for 1′, 18

Since 1′ = 60″, 15″ must be 15/60 of 1′, and the interpolated amount to be added for 15″ is 15/60 × 18, = 4; 18 being the tabular difference for 1′. Thus the complete log. is 9.76747 + 4 = 9.76751.

Table 44 has also a table of proportional parts which does away with the necessity of computing for seconds. At the right of the sine column is a little column headed "Diff." Now the left hand "M" or minute column is numbered from 1 to 60, and is used as the key to the "Diff." column. These two columns together make a table of proportional parts, similar to the little tables printed in Table 42. Run down the M column to 15, and opposite 15, read 4 in the Diff. column, which is the amount to be added for 15″.

But watch your step here: When the M column is used to take out angles to minutes, the *left* hand M column is used, and read down, when the angle appears at the *top* of the page; and the *right* hand M column is used and read up, when the angle appears at the *bottom*. But in interpolating for seconds, *the left hand M column only is used*, never the right hand one, and is always read down. Be careful of another thing: some functions increase as the angle gets larger; while other functions decrease. Thus, somtimes the interpolated value of the seconds must be added, and at other times subtracted. The way to do is to run your eye along the column you are using and see whether the function increases or decreases, and apply the figure representing the seconds accordingly; that is, add if increasing, and subtract if decreasing. Still again, there are three Diff. columns on each page. Always use the one which *adjoins* the function column you are using.

Examples.
Find log. cos. 54° 21′ 39″.
p. 807, reading from bottom
log. cos. 54° 21′ = 9.76554
for 39″. Find 39 in left hand M column. Opposite it, in the Diff. column adjoining the Cosine column, find 12

Subtract, because decreasing, 9.76542

Note: The functions of angles from 0° to 5°, and from 85° to 90° change so rapidly that it is impracticable to use tables of proportional parts for interpolation. Thus in the first 5 pages of Table 44, is printed the tabular differences for each minute in columns headed Diff. 1′, and interpolation is made by computing the proper fractional part of the difference for 1′ which the seconds may represent. Thus, p. 776, log. sin 4° 20′, the Diff. 1′ is 166. For 30″ it would be 30/60ths or ½ of 166, and so on.

Often, in a computation, we may have a result which dose not precisely match with the logs. in the tables. In such cases, in dead reckoning, the antilog is taken to the

(*Continued on page* 130)

Advertising Index will be found on page 134

KERMATH

"A Kermath Always Runs"

Have a New Kermath for 1922!

Adopted by 20 Prominent Boat Builders as Standard Equipment

The popularity of the latest Kermath marine motor 3 H.P., 1 cylinder 4 cycle engine has spread with such rapidity that already 20 of the most prominent boat builders in the country have adopted this unit as standard equipment. This must mean much to you as a prospective buyer. The expert opinion of these experts is the best guide you can obtain.

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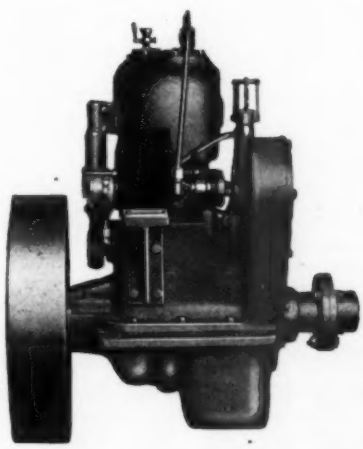
3 H.P. to 40 H.P. Marine Motors
$135 $1,550

Catalogue upon request. Write Dept. D.



MANY people seem to have anticipated this suggestion for never before in the history of our business at this time of the year have we been so rushed for orders but we are well able to take care of every one.

You know some months ago we advised all boat owners that we were keeping a full force going through the Winter keeping up production for two reasons. First—the increased production gave us a chance to decrease the prices to you and second—so that we would have an ample stock on hand to take care of all requirements.

Now is the time. Order your new Kermath today. Remember the new and reduced prices are the most attractive that have ever been offered and the reputation and standardization of the famous Kermath hardly needs any further mention.

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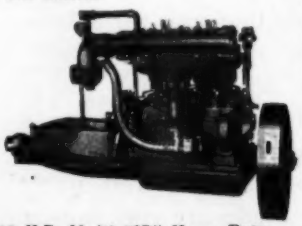

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REGAL GASOLINE ENGINE CO.

74 West Pearl St., Coldwater, Mich.

Short Cuts in Figuring

(*Continued from page* 128)

nearest minute, and we pay no attention to seconds. But if seconds are desired, they may be had by the reverse of the process above explained. Suppose we have a log. tangent 9.68032, and wish the antilog to seconds. Running through Table 44, on p. 797, we find, in the top tangent column:

25° 35′	log. tan =	9.68012
25° 36′	log. tan =	9.68044
Diff. for 1′		32

Our log. answer is 20 greater than the next lower log., and this difference equals $20/32 \times 60'' = 37''$, and our antilog is 25° 35′ 37″. In practice, we do not figure it out, but mentally find the difference between our log. and the next lower one in the table; in the above case 20. Then opposite 20 in the tangent Diff. column, we read 37 in the left hand M column, and thus at once have the number of seconds of arc our difference stands for.

This explanation of interpolation may seem like the worst thing yet. Let us hope it is the worst you will be called upon to read in these lessons. It sometimes takes a multitude of words to explain a process which the mind, with practice, can apply almost instantly. Just try to explain the 2 times table! We know of no way to turn interpolations into a penny thriller. But we do know that a few evenings plodding will unfold the manner of working log. tables, and that thereafter, except possibly for an occasional slip, they will trouble you no more. And take comfort in this, that in most actual dead reckoning problems, no interpolation whatever is necessary!

THE TRAVERSE TABLES

These are Bowditch Tables Nos. 1 and 2. They are the great dead reckoning tools of the navigator. As explained at the outset, dead reckoning problems are, in practice, generally worked by inspection. They are not computed, except in unusual cases, or where more than ordinary accuracy is desired. But methods of computation are studied, so that a comprehensive understanding of the subject may be acquired, and so as to be ready for the unusual case, when it arises.

Tables 1 and 2 contain the solutions of every right triangle. In Table 1, courses are given in points and quarter-points, with all distances up to 300 miles. It was the stand-by in the days of sailing ships, where courses closer than quarter-points were not attempted, and where the distances of a day's run rarely exceeded 300 miles. In Table 2, the courses are given in degrees, with all distances up to 600 miles, and this is the table more commonly used in these days of swift steamers and degree courses. But the scheme of each table is the same. As in the function tables we have used, courses less than four points or 45° appear at the top of the page, and courses over four points or 45° at the bottom.

A vessel sailing a particular course will change her position in latitude and departure by a certain amount for every mile sailed. Any vessel sailing the same course will experience the same changes. The traverse tables give the results of every conceivable course and distance (within their limits), and give them at a glance.

The method of using the table is as follows: Having sailed a certain course and distance, go into the table with the course. That is, open to the page where the course appears at the top or bottom. Then opposite the Dist., find the Lat. and Dep. The table is arranged in sets of columns, each set separated by heavy vertical lines; each set having three columns, headed, at the top of the page, Dist., Lat., Dep., or at the bottom of the page, Dist., Dep., Lat. That is, the Lat. and Dep. headings are reversed, like the headings in the function tables, and care must be taken to keep in the right column.

The columns headed "Lat." really give the difference of latitude (DL). When the DL and Dep are taken out, always carefully mark them so as to indicate the direction in which they are to be applied. Thus, mark the DL N or S, and the Dep E or W, as the case may be. Until experience has been gained, it is helpful to draw a rough diagram illustrating the triangle involved, taking care to have it

(*Continued on page* 132)

Advertising Index will be found on page 134

EVINRUDE OUTINGS No. 2
Distant fishing grounds are easily reached when your rowboat or canoe is Evinrude-powered.

Fishin' De Luxe!

THERE'S a new joy to fishing—a new "e-fish-ency"—when **your** boat is Evinrude-powered. No long, tiresome row to take the edge off the day's sport. You reach the best fishing grounds **early,** and you're fresh and fit when you get there. You've set up your tackle on the way.

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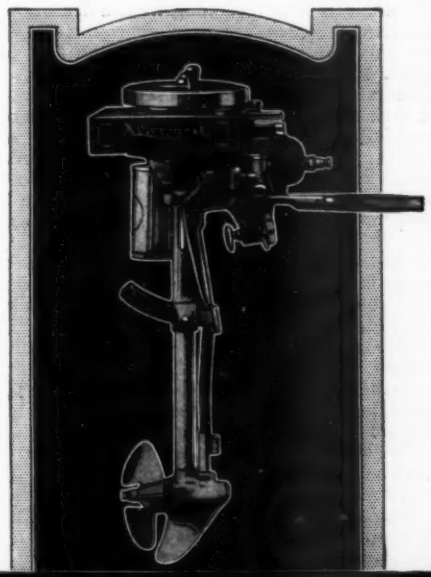

See these Evinrude motors at your sporting goods or hardware dealer's. Ask him about the Built-in-flywheel Magneto, Tilt-up Attachment and other Evinrude features. Or write for catalog and new prices (recently cut to pre-war level).

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DETACHABLE MOTORS FOR WATERCRAFT

Standard—the famous 2 H.P. motor used all over the world.
Lightweight—the sport model, lightest practical motor built.

Short Cuts in Figuring

(*Continued from page* 130)

"headed" the right way. It avails nothing to painstakingly find a DL and Dep if the DL is applied north when it should be south, or the Dep. east when it is really west.

Problem. A ship sails N 29° E, 79 miles. Find the DL and Dep. At p. 588, we find 29° courses, at the top. Opposite 79 in the Dist. column, we read Lat. 69.1, Dep. 38.3. Mark the DL N and the Dep. E.

Take a course of 61°, Dist. 281 miles. On the same page, but reading from the bottom, opposite 281 in the Dist. column, we find Dep. 245.8 E, Lat. 136.2 N.

Note that on p. 588, at the top, alongside of 29°, we find: (151°, 209°, 331°). This is to facilitate the use of the table for Navy style compass courses. Really C 151° is the same as S 29° E, and C 209° equals S 29° W. All of them involve 29° angles.

Suppose this case: Sailed C 29°, Dist. 59.4 miles. Here we can interpolate. Take the Lat. and Dep. for 59 and also for 60 miles; take .4 of the difference between them, and add it to the amounts for 59 miles, thus getting the values for 59.4. Or we could take out the Lat. and Dep. for 594 miles (10 times that given), and then point off one place to the left, thus dividing by 10 and reducing the amounts to correspond with a distance of 59.4.

Again, if we had an extraordinarily long distance, such as 2,500 miles, we could point off one place, thus bringing it within the limits of the table, and take out the data for 250 miles. But we must then remember to multiply the figures taken out by 10 to make them correspond with a Dist. of 2,500. Or we could divide the Dist. by 5, and go into the table with 500, or use any other convenient divisor; but the figures taken out must always be multiplied by the same factor.

Examples for practice:

Using the traverse tables, find the DL and Dep for the following sailings: (Figs. 7 and 8 will be of aid in finding the course angle. Also, see Bowditch, p. 16.)

Example 13: Course NNW ¾ W, Dist 259.3 miles (Ans. DL 222.4 N, Dep 133.4 W).

Example 14: Course, E ½ S, Dist 49.7 miles (Ans. DL 4.9 S, Dep. 49.5 E).

Example 15: Course, 198° Dist 225 miles (Ans. DL 214 S, Dep. 69.5 W).

Example 16: Course, S 68° E, Dist 137 miles (Ans. DL 51.3 S, Dep. 127 E).

Example 17: Course, N 85° W, Dist 337 miles (Ans. DL 29.4 N, Dep. 335.7 W).

Example 18: Course, 287°, Dist 1287 miles (Ans. DL 376.2 N, Dep. 1231 W).

Another use of the traverse table, is to find the C and Dist. from a given DL and Dep. This is not so easy. It is really the same problem worked backwards, but we have to do some hunting to find a DL and Dep. in the table which matches with those given; and probably we shall not find perfect agreement. Then we take the nearest ones, and let it go at that; or if we are very punctilious, we may interpolate to get closer results, or compute.

Suppose we have a Dep. of 136 miles, and a DL of 175', to find the C and Dist. Remember, that while the DL is really minutes of arc, its linear value is the same as miles, and it may be treated as such. Now we need not start on page 1 of the table and thumb it all through until we find what we are looking for. We know that if the DL and Dep. are the same, the angle will be 45°. If the Dep. is less than the DL, the angle is under 45°; and if greater, the angle will be over 45°. A small Dep. and a large DL will give a small angle. A large Dep. and a small DL will give a big angle, and so on. Draw a few rough diagrams, and this will all be apparent. While we may not know just where to open the table, we can make a wise guess, and probably come pretty near it. Now in the above problem, the Dep. is less than the DL. Hence, the angle is under 45°, but not much under it, for the difference between the sides is not great. Suppose we guess the angle to be 40° and open to that page. (p. 610) Here, with a DL of 174.7 we have a Dep. of 146.6, which is too much. Turn back a page (to p. 608). Here with a DL of 174.9, the Dep. is 141.6. Better, but still too much. Try p. 606. Here with DL 174.9, Dep. is 136.7. Very close, and as near as we can get it, because if we go another page it gets further out. Thus with a DL of 174.9, Dep. 136.7, which is very close to our figures, the Dist. is 222, and the C 38°. Plainly, the answer is to the nearest degree, and the Dist. cannot be out more than a fraction of a mile. We fancy most navigators would call this good enough. Now we could get closer by interpolation. But interpolation, in this case, is not so easy as where we had a course and distance given. That was a single interpolation. But when we go into the traverse table with a Lat. and Dep., we often find that neither of the quantities agree with those in the table, and a double interpolation would be necessary. An approximate interpolation can generally be made mentally; but the writer considers it easier to compute than to work out a precise double interpolation. In practically all cases, the traverse table will give sufficiently accurate results, either directly, or by rough mental interpolation. If greater precision, in a particular case, is desired, the computation method is recommended.

Examples for practice:

Find the Course and Dist. for the following sailings, by traverse table:

Example 19: DL 169' S, Dep. 49 miles E (Ans. C, S 16° E, Dist. 176).

Example 20: DL 3° 17' S, Dep. 317 miles W (Ans. C, S 58° W, Dist 374).

Example 21: DL 201' N, Dep. 378 miles W (Ans. C, N 62° W, Dist 428).

Example 22: DL 4° 29' N, Dep. 188 miles, E (Ans. C, N 35° E, Dist 328).

Dead reckoning accuracy. Before taking up the sailings, which come in the next lesson, it may be worth while to discuss the degree of precision requisite for dead reckoning solutions. The mathematics of dead reckoning are very precise. We can compute to seconds of arc! Yet every computer knows it is mere folly to carry mathematics to a fine point, when the factors dealt with are only approximate. Diamonds may be weighed by carats, but coal is weighed by the ton. In dead reckoning we are dealing with courses and distances which are only approximate. The finest compass only reads to degrees. But who can steer even to a degree? Bad steersmanship, wind, waves, currents, instrumental imperfections or settings, errors in deviation and variation, all induce errors which may amount to a number of degrees, even with the utmost care to eliminate them. Again, how accurate are patent logs, or engine revolutions, as distance guides? How often does a vessel overlog or underlog? Sometimes, even with the best instruments and the greatest care and skill, the distance may be miles out.

It is well to fasten in mind the thought that dead reckoning gives an approximate result, obtained from approximate data; and that you may compute until you are black in the face, without changing the position of your vessel a single inch. No matter what your figures say, she will not be there precisely; and instead of cultivating the habit of relying upon mathematical exactitude, it is better to expect error, and form the habit of using the sounding lead!

We do not mean that dead reckoning computations should be slip-shod. We should figure close enough so that no material error will be induced through our mathematics. But beyond this we need not and should not go.

In dead reckoning by computation, it is considered good practice to compute distances to tenths of miles, and angles and courses to minutes of arc, but never to seconds. The aim is really to get the course to the nearest degree. But in some problems, like the middle latitude problem, several successive computations are required to obtain the course. If minutes of arc were disregarded throughout, the small errors might pile up so as to throw the answer out by a degree or so, and this would not be permissible. Hence, angles are computed to minutes, and the ultimate course, when found, generally taken to the nearest degree.

In using the traverse tables, some navigators advise that distances be taken to tenths of miles, and angles or courses to the nearest half degree. In the writer's opinion, there may be many cases where distances to the nearest mile would suffice, and it is enough to obtain the course to be steered to the nearest degree.

Westinghouse

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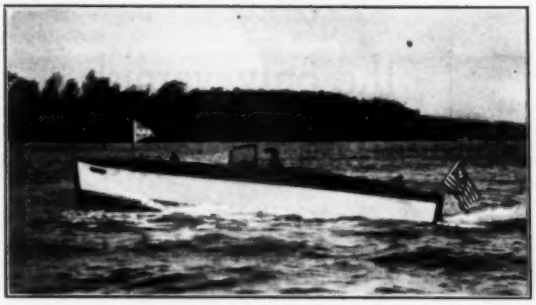

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